

Hyperthyroidism: Demography and Clinical Criteria in Al – Nasiriyah City (2022)

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Abstract:

Hyperthyroidism is a group of illnesses characterized by excessive thyroid hormone production and secretion by the thyroid gland, resulting in thyrotoxicosis, a hypermetabolic state. Diffuse toxic goiter (Graves disease), toxic multinodular goiter (Plummer disease), and toxic adenoma are the most frequent types of hyperthyroidism. Thyroid hormone levels are high in thyrotoxicosis, with or without increased thyroid hormone production.[1,2] Graves disease is the most frequent kind of hyperthyroidism in the United States, accounting for 60-80% of thyrotoxicosis cases. During a 20-year period, the annual incidence of Graves disease was determined to be 0.5 cases per 1000 population, with the peak occurrence in adults aged (20-40) years.[13] Toxic multinodular goiter (which accounts for 15-20% of thyrotoxicosis) is more common in iodine-deficient areas. Most people in the United States have enough iodine, while the incidence of lethal multinodular goiter in the US population is lower than in iodine-deficient areas of the world. Thyrotoxicosis caused by toxic adenoma in (3-5) percent of patients.

Methods: Descriptive, Cross-sectional study Retrospective study The study took place in Thiqr governate , study begun at 14th of march 2022 and ended at 11th of may 2022. The population of Thiqr about 2 million [20] , The study includes the students and staff from Thiqr university, children younger than 15 and elderly above 70 were excluded. Sample size is 430 given by the supervisor, collected through Google form-based Questionnaires published in the official websites of colleges of Thiqr University.

Analysis : Qualitative data had been analyzed by using SPSS (statistical package for social science), were Reliability, frequency, percentage and chi square had been calculated.

Results: A 430 patients suffer from thyroid disease, were recruited in this study that focus on different aspects of assessment, that include their sociodemography clinical character that scored according to Binned score.

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Introduction :

Hyperthyroidism is a group of illnesses characterized by excessive thyroid hormone production and secretion by the thyroid gland, resulting in thyrotoxicosis, a hypermetabolic state. Diffuse toxic goiter (Graves disease), toxic multinodular goiter (Plummer disease), and toxic adenoma are the most frequent types of hyperthyroidism. Thyroid hormone levels are high in thyrotoxicosis, with or without increased thyroid hormone production.[1,2]

Etiology :

Graves disease, toxic multinodular goiter, toxic adenoma, and painless thyroiditis are the most common endogenous causes of hyperthyroidism (Table 1) [3-4]. Graves disease, which is the most frequent cause of hyperthyroidism in the United States[5], is an autoimmune disorder. Female sex and family history risk factors. [5,6] Nodules form over time as clonogenic cells replicate frequently, resulting in somatic activating mutations of TSH receptors. [7] A toxic adenoma is a solitary nodule. In contrast to these three illnesses, painless or temporary (silent) thyroiditis results in the death of thyroid follicles and the release of preformed thyroid hormones into the circulation due to an autoimmune process. [8] It has the same clinical presentation as other reasons. According to scintigraphy, its frequency among patients with thyrotoxicosis was 0.5 percent in a Danish study. [9] Childbirth (postpartum thyroiditis) or the use of medications like lithium, interferon alfa, interleukin-2, and amiodarone can cause painless thyroiditis. [10]

Table 1. Etiology and Pathogenesis of Hyperthyroidism

<i>Etiology</i>	<i>Mechanism</i>
Most common causes	
Graves disease	Autoimmune process in which antibodies stimulate the TSH receptor leading to overproduction of thyroid hormones
Painless or transient (silent) thyroiditis	Autoimmune destruction of thyroid tissue leading to a release of preformed thyroid hormones
Toxic adenoma (Plummer disease)	Somatic mutation in TSH receptor or Gs alpha gene in a thyroid nodule
Toxic multinodular goiter	Expansion of clonogenic cells with an activating TSH receptor mutation
Less common causes	
Drug-induced thyroiditis	Overproduction of thyroid hormones (amiodarone-induced thyrotoxicosis type 1) or release of preformed thyroid hormones (amiodarone-induced thyrotoxicosis type 2, interferon alfa, interleukin-2, or lithium)
Hyperemesis gravidarum	High level of β -hCG stimulates TSH receptors
Postpartum thyroiditis	Variant of painless thyroiditis with the same mechanism, occurring after delivery
Subacute granulomatous (de Quervain) thyroiditis	Painful inflammation of the thyroid gland caused by viral infection, often with fever, triggering a release of preformed thyroid hormones
Rare causes	
Factitious thyrotoxicosis	Surreptitious ingestion of thyroid hormones
Metastatic follicular thyroid cancer	Metastasis of functional follicular thyroid cancer
Struma ovarii	Ectopic thyroid tissue in ovarian dermoid tumor produces thyroid hormones
Trophoblastic tumor or a germ cell tumor	Tumor produces β -hCG, which stimulates thyroid TSH receptors
TSH-secreting pituitary adenoma	Tumor secreting large quantities of TSH, and not responding to thyroxine and triiodothyronine feedback

Factors increase hyperthyroidism developing risk [11] :

- A female.
- Over 60 years old.
- Previously had thyroid issues.
- Have a family history of thyroid issues.
- Suffer from certain illnesses, such as type 1 diabetes.
- Iodine intake is excessive. This can happen if consume too much
- Iodine-rich food or take too much iodine-containing drugs.
- Pregnant or have recently given birth to a child.

Symptoms of hyperthyroidism can include[12]: palpitations, nervousness, weight loss increase appetite, diarrhea, visual disturbance, thin hair, sweating, menstruation changes, sensitivity heat , sleep disturbance, bulging of eye, goiter and wasting of muscle.

Epidemiology :

Graves disease is the most frequent kind of hyperthyroidism in the United States, accounting for 60-80% of thyrotoxicosis cases. During a 20-year period, the annual incidence of Graves disease was determined to be 0.5 cases per 1000 population, with the peak occurrence in adults aged 20-40 years. [13]

Toxic multinodular goiter (which accounts for 15-20% of thyrotoxicosis) is more common in iodine-deficient areas. Most people in the United States have enough iodine, while the incidence of lethal multinodular goiter in the US population is lower than in iodine-deficient areas of the world. Thyrotoxicosis is caused by toxic adenoma in 3-5 percent of patients.

Iodine intake affects the incidence of Graves disease and toxic multinodular goiter. The United States had higher cases of Graves disease as well as fewer cases of toxic multinodular goiters than parts of the world with lower iodine intake.

Mortality and Morbidity :

Graves disease"s mean rates of malignancy, toxic adenoma, and toxic multinodular goiter, respectively, were 5.9%, 6.5 %, and 12 %. The mean rates for papillary thyroid cancer, micropapillary carcinoma, and follicular thyroid cancer, respectively, were 3.1 percent, 5.1 percent, and 0.8 percent. [14]

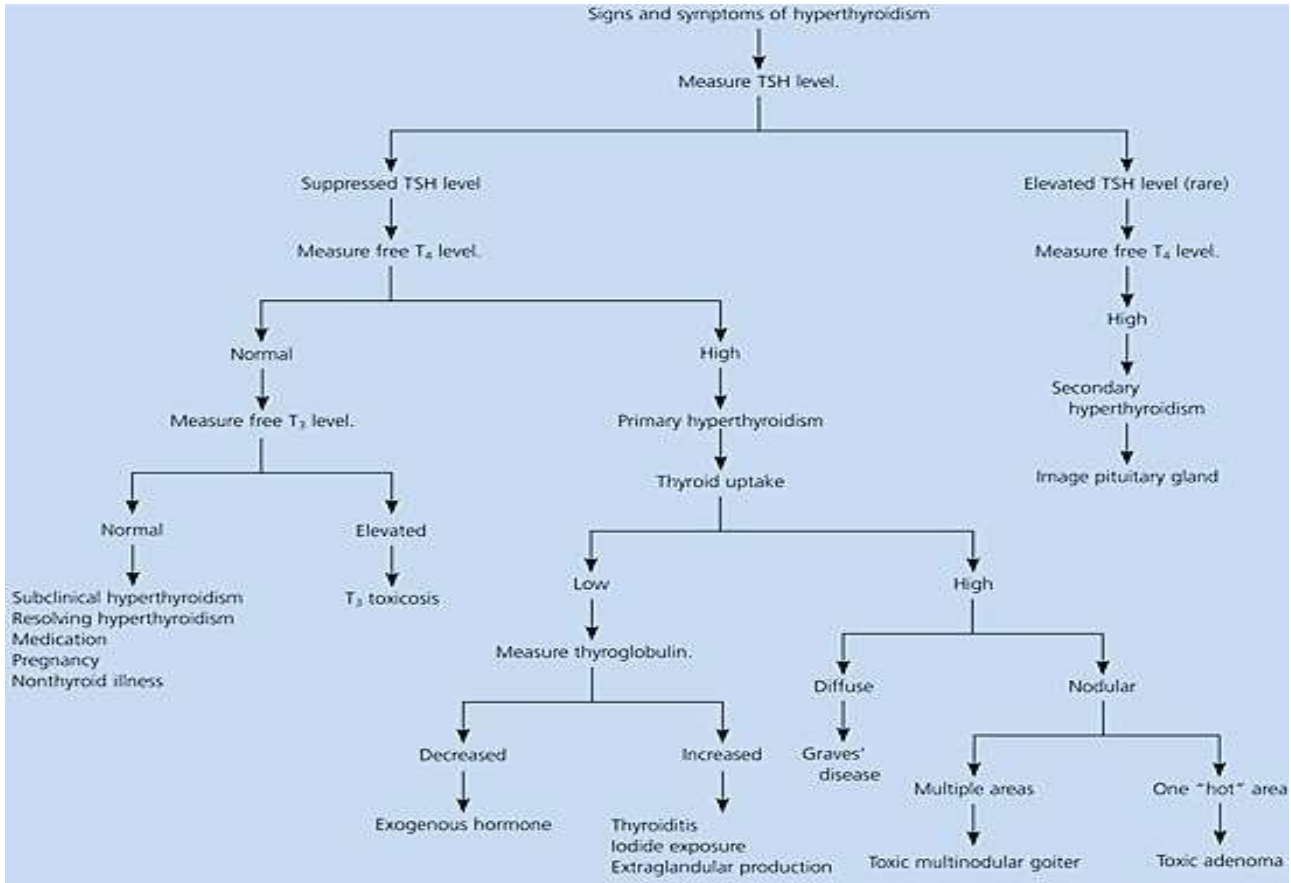
Hyperthyroidism in a study by Kim et al, was found to be as a risk factor for ischemic stroke and myocardial infarction in females, people over 50, and non-obese people, regardless of other cardiovascular risk factors. Hyperthyroidism, on the other hand, was not found to have a substantial impact on mortality from cardiovascular events.[15].

Diagnostic tool and approach screening :

Figure 2 [15,16] shows a diagnostic strategy for patients with hyperthyroidism signs and symptoms. In a patient who has a suspected diagnosis of hyperthyroidism but no indication of pituitary dysfunction, the TSH level is the only initial test that is required. If the TSH level is abnormal, more testing is required. Hyperthyroidism is diagnosed by a TSH level that is undetectable. Antithyroid antibodies are raised in Graves' disease and lymphocytic thyroiditis, but they are usually not required to diagnose the condition [17]. Thyroid-stimulating antibody levels can be used to track the

impact of antithyroid medication treatment in Graves' disease patients [18]. The high uptake of Graves' disease is clearly distinguished from the low uptake of thyroiditis, and the scan also offers additional helpful anatomic information[15].

Table 2:



Preventive control strategy :

The American Thyroid Association (ATA) evaluate that were more than 12% of the US population may have a thyroid issue at some point in their lives. Thyroid disease affects around 20 million Americans, with up to 60% of those affected being unaware of their condition. We've already talked about how the symptoms of this disease arise in people as they get older, which makes it difficult to link them to the sickness [19].

However, this does not make the disease any less dangerous, so must do everything possible to prevent it and reduce your risk of cardiovascular problems that often accompany it[19].

can prevent thyroid illness by doing the following things[19]:

- Quit smoking
- Consume less soy
- During x-rays, request a thyroid collar to protect your thyroid gland from radiation.
- Consider supplementing with selenium.
- Regular checks

Aim : to study and assess Hyperthyroidism in Thiqr governorate

Justification :

Hyperthyroidism disease from toxic multinodular goiter and permanent are usually occurs in adults. Later normalization of thyroid function with antithyroid medications, radioactive iodine ablation usually is optional as the absolute therapy. Long-term with high-dose antithyroid medication is not recommended. Toxic multinodular goiters and toxic adenomas possibly will continue to grow slowly in size during antithyroid pharmacotherapy, so quick detection is required.

Methodology :

Type of study : Diagnostic study to assess incidence of hyperthyroidism

Study design : Descriptive , Cross -sectional study

Study patterns : Retrospective study

Place & Time of study : The study took place in Thiqr governorate , study begun at 14th of march 2022 and ended at 11th of may 2022 .

Study Population : The population of Thiqr about 2 million [20] , The study includes the students and staff from Thiqr university, children younger than 15 and elderly above 70 were excluded.

Sampling and Sample size estimation : Sample size is 430 given by the supervisor , collected through Google form – based Questionnaires published in the official websites of colleges of Thiqr University.

Ethical Consideration : Ethical consent had been attained from the scientific committee of community medicine department / College of Medicine / Thiqr University and also from The Associate scientific Dean of the Same College , and Finally an written consent was taken from each participant .

Definition of Variables :

Hyperthyroidism (overactive thyroid) occurs when your thyroid gland produces too much of the hormone thyroxine. Hyperthyroidism can accelerate your body's metabolism, causing unintentional weight loss and a rapid or irregular heartbeat.

Statistical Analysis : Qualitative data had been analyzed by using SPSS (statistical package for social science) , were Reliability , frequency , percentage and chi square had been calculated .

Epidemiological Analysis :

incidence =
$$\frac{\text{Total number of new cases in a given place and time}}{\text{population at risk}}$$

population at risk

Results:

A 430 patients suffer from thyroid disease, were recruited in this study that focus on different aspects of assessment, that include their socio-demography clinical character that scored according to Binned score.

Table 3: Distribution according to the sex

	Sex	Score	Mean of Score	Score (Binned)
Male	N	171	171	171
	Mean	14.16	1.6275	1.32
	Std. Deviation	8.494	.22905	.466
Female	N	259	259	259
	Mean	16.35	1.5447	1.36
	Std. Deviation	7.387	.19488	.482
Total	N	430	430	430
	Mean	15.48	1.5776	1.34
	Std.Deviation	7.909	.21278	.476
	ANOVA	8.009	16.154	1.012
	P	.005	.000	0.315

Table 4: Distribution according clinical criteria

		Score	mean of score	Score (Binned)
Palpitation yes	N	233	233	233
	Mean	19.46	1.4638	1.53
	Std. Deviation	6.875	.17938	.500
No	N	197	197	197
	Mean	10.77	1.7122	1.13
	Std. Deviation	6.310	.16559	.334
Anxiety yes	ANOVA	183.887	219.495	91.949
	P	.0001	.0001	0.0001
	N	284	284	284
No	Mean	17.94	1.5030	1.46
	Std. Deviation	7.243	.18910	.499
	N	146	146	146
Weight loss yes	Mean	10.70	1.7227	1.12
	Std. Deviation	6.914	.17910	.330
	ANOVA	99.374	134.845	53.512
No	P	.0001	.0001	0.0001
	N	179	179	179
	Mean	18.83	1.4899	1.47
Increase appetite	Std. Deviation	7.311	.19672	.501
	N	251	251	251
	Mean	13.09	1.6402	1.25
Diarrheal disease yes	Std. Deviation	7.450	.20176	.434
	Anova	63.005	59.160	24.407
	P	0.0001	0.0001	0.0001
No	N	199	199	199
	Mean	18.42	1.5063	1.46
	Std. Deviation	7.063	.19149	.500
Visual defect	N	231	231	231
	Mean	12.95	1.6391	1.24
	Std. Deviation	7.733	.21141	.429
No	ANOVA	58.018	45.983	24.075
	P	0.0001	0.0001	0.0001
	N	56	56	56
Visual defect	Mean	23.63	1.3443	1.75
	Std. Deviation	7.747	.19115	.437
	N	374	374	374
Visual defect	Mean	14.26	1.6126	1.28
	Std. Deviation	7.187	.19310	.451
	ANOVA	80.988	94.271	52.491
Visual defect	P	0.0001	0.0001	0.0001
	N	197	197	197
	Mean	18.80	1.4791	1.48

	Std. Deviation	7.388	.19398	.501
	N	233	233	233
	Mean	12.67	1.6609	1.23
	Std. Deviation	7.230	.19167	.420
	ANOVA	75.167	94.925	32.900
	P	0.0001	0.0001	0.0001
Hand Wetness and Profuse Sweating Yes	N	157	157	157
	Mean	21.28	1.4294	1.65
	Std. Deviation	7.022	.19133	.479
No	N	273	273	273
	Mean	12.15	1.6629	1.17
	Std. Deviation	6.309	.17448	.375
	ANOVA	192.175	166.192	133.517
	P	.000	.000	.000
Hair drop	N	309	309	309
	Mean	17.42	1.5122	1.42
	Std. Deviation	7.453	.18961	.494
	N	121	121	121
	Mean	10.52	1.7446	1.16
	Std. Deviation	6.820	.17455	.365
	ANOVA	78.156	136.398	27.692
	P	0.0001	0.0001	0.0001
	N	430	430	430
	Mean	15.48	1.5776	1.34
	Std. Deviation	7.909	.21278	.476

Score mean of score (Binned) x sex

- Chi square : there is association between incidence of Hyperthyroidism and female patient more than male (female about 63 % of cases are female while 47% are male) , also there is an association between incidence of Hyperthyroidism and age group 20 – 29 yrs (73 % of cases of Hyperthyroidism is in this age group).
- Incidence = 7.4 per 100,000 inhabitants

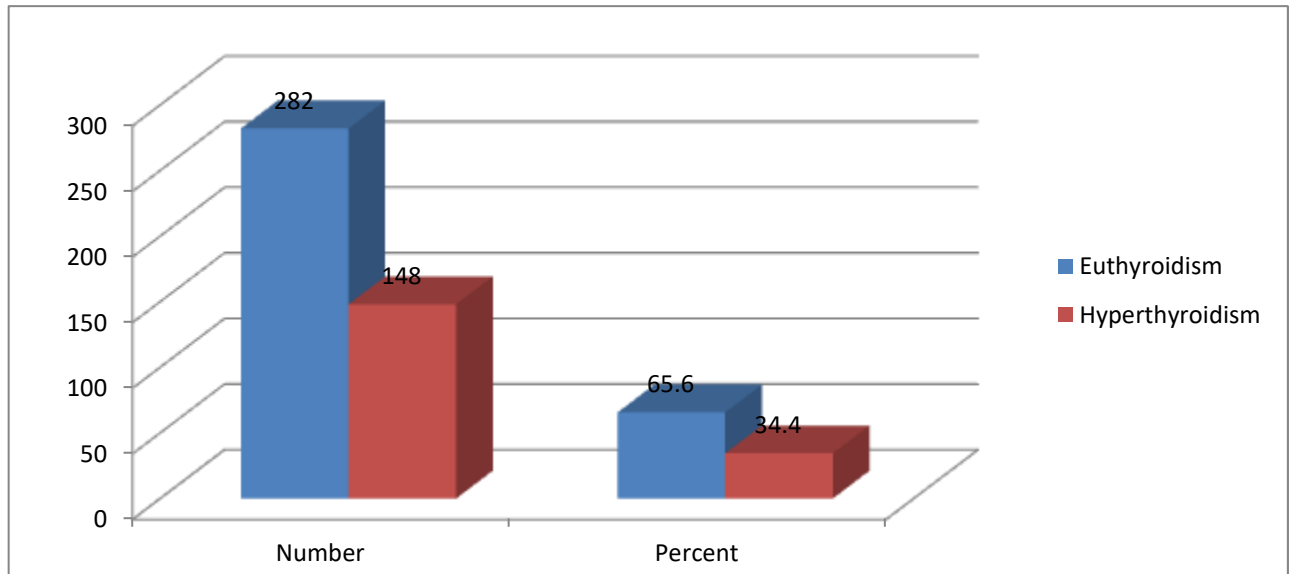


Figure (1):

Table 5: Relationship between types of thyroid diseases and clinical criteria of score

	Euothyroid		Hyperthyroidism		Total	Chi-square, P value	
	Yes	No	Yes	No		Chi-square, P value	P value
Palpitation			Yes	110	123	233	76.042 ^a
				39.0%	83.1%	54.2%	.000
			No	172	25	197	
				61.0%	16.9%	45.8%	
Anxiety	Yes		154	130	284	47.787 ^a	
			54.6%	87.8%	66.0%		
			No	128	18	146	
				45.4%	12.2%	34.0%	
Weight loss	Yes		94	85	179	23.198 ^a	
			33.3%	57.4%	41.6%	.000	
			No	188	63	251	
				66.7%	42.6%	58.4%	
Loss of appetite	Yes		107	92	199	22.899	
			37.9%	62.2%	46.3%	0.0001	
			No	175	56	231	
				62.1%	37.8%	53.7%	
Diarrhea	Yes		14	42	56	46.579	
			5.0%	28.4%	13.0%	0.001	
			No	268	106	374	
				95.0%	71.6%	87.0%	
Sweating	Yes		55	102	157	102,312	
			19.5%	68.9%	36.5%	0.0001	
			No	227	46	273	
				80.5%	31.1%	63.5%	
Sleep disturbance	Yes		128	116	244	43.032	
			45.4%	78.4%	56.7%	0.0001	
			No	154	32	186	
				54.6%	21.6%	43.3%	
Total	Count		282	148	430		
	Percentage		100.0%	100.0%	100.0%		

Discussion :

In this study, the total incidence of hyperthyroidism was 7.4 per 100,000 inhabitants per year in Thiqr governorate, also this study shows that there is association between incidence of Hyperthyroidism and female patients more than male (female about 63 % of cases are female while 47% are male) , also there is an association between incidence of Hyperthyroidism and age group 20 – 29 yrs (73 % of cases of Hyperthyroidism is in this age group) , The main obstacle in this study was time .

The total incidence in Thiqr governorate is less than that of Sweden which is 27.6/100 000 inhabitants per year [21] , and that of Denmark (standardized incidenceratio (SIR) 81.6/100 000 per year) [22]. Although not statistically significant, the month of April had the largest number of patients with hyperthyroidism in this study. This supports prior research that have shown no seasonal fluctuation [23] , However, this contradicts other findings of a higher frequency of hyperthyroidism in the spring and summer, which have been linked to increased iodine intake [24, 25] or higher temperatures [26, 27]. Iodine supplementation in an iodine-deficient population has been proven in numerous investigations to increase the number of new cases of hyperthyroidism [28–29].

Iodized salt was first introduced in Iran in 1989, The prevalence rate of overt hyperthyroidism was 0.34 percent one year after 75 percent of the population begantaking iodized salt in a cross-sectional study of 6048 randomly selected patients. Thewriters came to the conclusion that there had been no hyperthyroidism epidemic [30]. Before iodine supplementation, no information on the prevalence of hyperthyroidism was known. Through autoregulation, the typical thyroid can handle a moderate amount of iodine [31]. Extra iodine may cause an increase in thyroid hormone synthesis and IIH in a benign multinodular goiter with autonomous functional nodules. Nontoxic multinodular goiter is common in those who don't getenough iodine [32]. The autonomous thyroid nodules are thought to form as a resultof one or more of the compensatory processes for low iodide levels. The production of H₂O₂, which is up-regulated in thyroid follicular cells during ID, is one possiblepathway [33].

Conclusion :

The incidence of hyperthyroidism in Thiqr governorate (7.4 per 100,000 inhabitants per year) is in the lower range compared with earlier international reports. 73 % of cases of Hyperthyroidism is in 20 – 29 yrs age group. We have observed clear geographical differences between male and female about 63 % of cases are female while 47% are male .

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