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The Incidence of Thyroid Disorders and Associated Comorbidities: A prospective population study

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Abstract:
Background: Thyroid dysfunction is one of the leading endocrine disorders. It represents 30 – 40 % of patient seen in the endocrine clinic. The undiagnosed thyroid dysfunction may adversely affect metabolic control especially fore those with associated comorbidities. Abnormal thyroid function has important ramifications on health outcomes including cardiovascular arrhythmia, metabolism, bone health and mental health.
Objective: to assess the incidence of thyroid abnormalities and its association with other comorbidities.
Patient and Methods: A prospective study was conducted on 540 patients who attended the outpatient surgical clinic in Al – Kadhimain medical city March 2019 to July 2020. Assessment was done by thorough history, clinical examination and laboratory investigations. 381 patients found to have normal thyroid function and 159 patients had thyroid dysfunction. Thyroid stimulating hormone and free thyroxin were used as screening test for diagnosis.
Results: The incidence of thyroid dysfunction among studied population was 29.4%. The most common thyroid dysfunction was subclinical hypothyroidism (37.1%) followed by clinical hypothyroidism (27.67%), clinical hyperthyroidism (21.4) and subclinical hyperthyroidism (13.8%). The incidence of thyroid dysfunction was higher in middle and old age group than the young age group with higher incidence in women (58.5%) than men (41.5%). Approximately 40.2% of diabetic patients in the studied population had thyroid dysfunction. The incidence of thyroid dysfunction among hypertensive patients in the studied population was 42.9%.
Conclusion: The most common thyroid dysfunction was subclinical hypothyroidism. The incidence was higher in association with other comorbidities such as diabetes mellitus and hypertension. The incidence was higher in middle and old age group than the young age group with higher incidence in women than men. Therefore, screening programs is essential for early diagnosis and treatment.

OBJECTIVES:

The objectives of this study were to assess the incidence of thyroid abnormalities and its association with other comorbidities.

INTRODUCTION:

Thyroid dysfunction is one of the leading endocrine disorders. It represents 30 – 40 % of patient seen in the endocrine clinic. [1] The prevalence of thyroid dysfunction varies with age, sex, race / ethnicity, and geographically through variations in dietrey iodine intake. [2, 3, 4]

Undiagnosed thyroid disorders could be classified into hyperthyroidism and hypothyroidism. Theses disorders could be further subclassified into clinical and subclinical thyroid dysfunctions. [1]

Low levels of thyroid stimulating hormone (TSH) are detected in patient with hyperthyroidism while in patient with hypothyroidism; high levels of TSH are detected. When TSH levels are abnormal and free thyroxin (FT4) levels are within the reference range, this is referred to as subclinical thyroid dysfunction. Therefore, the diagnosis of thyroid disorder requires both TSH and FT4 measurements. [5]

There is association between undiagnosed thyroid dysfunction and other comorbidities, e. g, subclinical and clinical hypothyroidism may increase the risk of hyperlipidemia and atherosclerosis leading to increasing risk of coronary artery disease and cardiovascular mortality. [6] Abnormal thyroid function has important ramifications on health outcomes pertinent to older adults, including cardiovascular arrhythmia, metabolism, bone health and mental health. [7 – 11]

PATIENTS AND METHODS:

This study was conducted among 540 patients who were seeking medical advice at the surgical outpatient clinic in Al – Kadhimain medical city from March 2019 to July 2020.

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The assessment was done by thorough history and clinical examination. Blood samples were obtained from all patients and send for full investigations including thyroid function test (TFT), glycated hemoglobin (HbA1c), plasma glucose level and total lipid profile.

According to American thyroid association guidelines, combined measurement of thyroid stimulating hormone (TSH) and free thyroxin (FT4) is the most efficient combination of blood tests for diagnosis and follow up of thyroid disorders. [12]

After measuring of TSH and FT4, the patients were divided into those with normal thyroid function (euthyroid state) and those with thyroid dysfunction. The patients with thyroid dysfunction were subdivided into four groups:

1. Subclinical hypothyroidism: are those patients with TSH between 4.5 and 19.9 mU/l but the level of FT4 was normal. [13, 14]
2. Clinical hypothyroidism: are those patients with TSH equal or more than 20 Mu/L ***OR*** TSH between 4.5 and 19.9 mU/l with low level of FT4. [13, 14]
3. Subclinical hyperthyroidism: are those patients with low level of TSH (under 0.45 mU/l) but the level of FT4 was normal.
4. Clinical hyperthyroidism: are those patients with low level of TSH (under 0.45 mU/l) and high level of FT4.

RESULTS:

This study was conducted among 540 patients who attended the surgical outpatient clinic in Al – Kadhimain medical city.

Among those 540 patients, 381 (70.6%) patients had normal thyroid function (euthyroid state) and 159 (29.4%) had thyroid dysfunction. Table (1)

Table (1) Number of patients with thyroid dysfunction and those with euthyroid state

Characteristics	*Number of patients (total = 540)*	*Percentage (%)*
Euthyroid	381	70.6
Thyroid dysfunction	159	29.4

Among those 159 patients, 103 patients (64.8%) had hypothyroidism whether clinical or subclinical state. The incidence of clinical hypothyroidism was 27.67 (44 patients) while that of subclinical hypothyroidism was 37.1% (59 patients).

In this study, 56 patients (35.2%) were found to have hyperthyroidism. The incidence of clinical hyperthyroidism was 21.4% (34 patients) while that of subclinical hyperthyroidism was 13.8% (22 patients). Table (2)

Table (2) Classification of patients with thyroid dysfunction

Characteristics	*Number of patients (total = 159)*	*Percentage (%)*
Clinical hypothyroidism	44	27.67
Subclinical hypothyroidism	59	37.1
Clinical hyperthyroidism	34	21.4
Subclinical hyperthyroidism	22	13.8

Patients with thyroid dysfunction were older than those with normal thyroid function and more frequently females. Table (3) and Table (4)

Table (3) Age incidence in patients with thyroid dysfunction

Age group (in years)	*Number of patients (total = 159)*	*Percentage (%)*
< 25	13	8.1
> 25 – 35	31	19.4
> 35 – 45	49	31.8
> 45 – 55	44	27.6
> 55 – 65	22	13.8

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Table (4) Sex incidence in patients with thyroid dysfunction

Sex group	*Number of patents (total = 159)*	*Percentage (%)*
Male	66	41.5
Female	93	58.5

The association of diabetes mellitus (DM) and hypertension (HT) was more in patients with thyroid dysfunction than those with euthyroid state.

Out of 381 patients with euthyroid state, 84 (22.04%) patients had DM in comparison with 64 (40.2%) patients out of 159 patients with thyroid dysfunction. Table (5)

Table (5) Incidence of DM in patient with normal and abnormal thyroid function

Characteristics	*DM*	*No DM*	*P value*
Euthyroid patients (total = 381)	84 (22.05%)	297 (77.95%)	< 0.001*
Patients with thyroid dysfunction (total = 159)	64 (40.2%)	95 (59.3%)	< 0.001*

- DM, diabetes mellitus. * P value less than 0.005

107 (28.08%) patients out of 381 patients with normal thyroid function had HT in comparison with 73 (45.9%) out of 159 patients with thyroid dysfunction. Table (6)

Table (6) Incidence of HT in patient with normal and abnormal thyroid function

Characteristics	*HT*	*No HT*	*P value*
Euthyroid patients (total = 381)	107 (28.1%)	274 (71.9%)	< 0.001*
Patients with thyroid dysfunction (total = 159)	73 (45.9%)	86 (54.1%)	< 0.001*

- HT, hypertension. * P value less than 0.005

Among patients with thyroid dysfunction, the incidence of these comorbideties was higher in patients with clinical and subclinical hypothyroidism than those with hyperthyroidism. Table (7) & Table (8)

Table (7) Incidence of DM in patients with thyroid dysfunction

Characteristics	*DM (total = 64)*	*Percentage (%))*
Subclinical hypothyroidism	14	21.875
Clinical hypothyroidism	23	35.9375
Subclinical hyperthyroidism	11	17.1875
Clinical hyperthyroidism	16	25

Table (8) Incidence of HT in patients with thyroid dysfunction

Characteristics	*HT (total = 73)*	*Percentage (%)*
Subclinical hypothyroidism	19	26.06
Clinical hypothyroidism	29	39.72
Subclinical hyperthyroidism	11	15.06
Clinical hyperthyroidism	14	19.17

DISCUSION:

Our study revealed that the incidence of thyroid dysfunction was 29.4% of the studied population. The most common thyroid dysfunction was subclinical hypothyroidism (37.1%) followed by clinical hypothyroidism (27.67%), clinical hyperthyroidism (21.4%) and subclinical hyperthyroidism (13.8%).

Our results were similar to that obtained in a study in Delhi. They found that the incidence of clinical hypothyroidism was 19.3% of studied population. [(15)]

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Sex & Thyroid dysfunction:

Our study demonstrated that thyroid dysfunction were more common in women than men. The most common thyroid dysfunctions among women were subclinical and clinical hypothyroidism.

These results are in agreement with the results that obtained by Golden *et al* who reported that the incidence of hypothyroidism was higher in women than men. [16]

In contrary to our results, there are studies suggest that the prevalence of hyperthyroidism is 10 times more common in women than in men. [17, 18]

Age & thyroid dysfunction:

In our study, the incidence of thyroid dysfunction among the studied patients was higher in middle and old age group than the young age group. Our results are in agreement with those results obtained by Bensor and his group. [19]

Diabetes mellitus & Thyroid dysfunction:

Our study revealed that the incidence of thyroid dysfunction among diabetic patients in the studied population was 40.2%.

Several studies have implicated that thyroid hormones a key role in regulating energy balance, metabolism of glucose and lipid. [20] Thyroid hormones have anti – insulin action such as stimulating hepatic gluconeogenesis and glycogenolysis. They also up – regulate the expression of genes such as glucose transporter type – 4. [21]

Our results are in agreement with that results obtained by Smithson who found that about 10.8% of diabetic patients had thyroid dysfunction. [22]

Similar results were obtained by Perros *et al* who found that the prevalence of thyroid dysfunction among diabetic patients was 13.4%. [23]

Several studies had been done to evaluate the association of thyroid dysfunction with diabetes mellitus. These studies revealed that the prevalence of thyroid dysfunction among diabetic patients was higher than that among general population. [20, 21]

Hypertension & Thyroid dysfunction:

Our study revealed that 45.9% of hypertensive patients in the studied population had thyroid dysfunction. The most common thyroid dysfunctions in those patients were clinical and subclinical hypothyroidism.

These results are in agreements with that results obtained by Owen *et al*. They found that there was a high prevalence of hypertension among patients with hypothyroidism. [24]

There are complications that may be associated with clinical or subclinical thyroid dysfunction and these complications can not be neglected. These complications can be sever in patients with associated comorbidities. Therefore, universal screening for thyroid dysfunction is very important.

CONCLUSION:

The incidence of thyroid dysfunction was 29.4% of the studied population. The most common thyroid dysfunction was subclinical hypothyroidism (37.1%) followed by clinical hypothyroidism (27.67%). The incidence was higher in association with other comorbidities such as diabetes mellitus and hypertension. The incidence was higher in middle and old age group than the young age group with higher incidence in women than men. Therefore, screening programs is essential for early diagnosis and treatment.

REFERENCES:

1. Segaye B, Ergete W. Histopathologic pattern of thyroid disease. East Afr Med J 2003; 80: 525 – 528.
2. Ittermann T, Khattak RM, Nauck M, Cordova CM & Volzke H. Shift of the TSH reference range with improved iodine supply in Northeast Germany. *Eur J Endocrinol* 172, 261 – 267, http: // doi. Org/ 10.1530/ EJE – 14 – 0898 (2015).
3. Meisinger C *et al*. Geographic variation in the frequency of thyroid disorders and thyroid peroxidase antibodies in persons without former thyroid disease within Germany. *Eur J Endocrinol* 167, 363 – 371, http: // doi. Org/ 10. 1530/ EJE – 12 – 0111 (2012).
4. Canaris GJ, Manowitz NR, Mayor G, Ridgway EC. The Clorado thyroid disease prevalence study. Arch Intern Med 2000; 160: 526 – 534.
5. Baloch Z, Carayon P, Conte – Devoix B, Demers LM, Feldt – Rasmussen U, Henry JF, *et al*. Laboratory medicine practice guidelines. Laboratory support for the diagnosis and monitoring of thyroid disease. Thyroid 2003; 13: 3 – 126.

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6. Enemali , M. U. ., & Yilkahan, D. I. . (2021). Antibiotic Susceptibility and Biofilm Formation of Clinical Isolates of Pseudomonas Species from Wounds Specimens. Journal of Scientific Research in Medical and Biological Sciences, 2(3), 67-74. https://doi.org/10.47631/jsrmbs.v2i3.322
7. Volzke H, Ludemann J, Robinson DM, Spieker KW, Schwahn C, KramerA, *et al*. The prevalence of undiagnosed thyroid disorders in previously iodine – deficient area. Thyroid 2003; 13: 803 – 810.
8. Biondi B & Cooper DS. The clinical significance of subclinical thyroid dysfunction. *Endocr Rev* 29, 76 – 131, https:// doi. Org/ 10. 1210/ er. 2006 – 0043 (2008).
9. Cooper DS & Biondi B. Subclinical thyroid disease. *Lancet* 379, 1142 – 1154, https:// doi. Org/ 10. 1016/ S0140 – 6736 (11) 60276 – 6 (2012).
10. Juarez – Cedillo T, et al. Prevalence of thyroid dysfunction and its impact on cognition in older mexican adults: (SADEM study). *J Endocrinol Invest* 40, 945 – 952, https:// doi. Org/ 10. 1007/ s40618 – 017 – 0654 – 6 (2017).
11. Peppa M, Betsi G & Dimitriadis G. Lipid abnormalities and cardiometabolic risk in patients with overt and subclinical thyroid disease. *J Lipids* 2011, 575840, https:// doi. Org/ 10. 1155/ 2011/ 575840 (2011).
12. Tan ZS et al. Thyroid function and the risk of Alzheimer disease: the Framingham study. *Arch Intern Med* 168, 1514 – 1520, https:// doi. Org/ 10. 1001/ archinte. 168. 14. 1514 (2008).
13. Ladenson PW, Singer PA, Ain KB, Bagchi N, Bigos ST, Levy EG, *et al*. American thyroid association guidelines for detection of thyroid dysfunction. Arch Intern Med 2000; 160: 1573 – 1575.
14. Blum MR, Bauer DC, Collet TH, Fink HA, Cappola AR, da Costa BR, *et al*. Subclinical thyroid dysfunction and future risks: a meta – analysis. JAMA 2015; 313: 2055 – 2065.
15. Rodondi N, den Elzen WP, Bauer DC, Cappola AR, Razvi S, Walsh JP, *et al*. Subclinical hypothyroidism and the risk of coronary heart disease and mortality. JAMA 2010; 304: 1365 – 1374.
16. Marwaha RK, Tandon N, Gupta N, Karak AK, Verma K, Kochupillai N. Residual goiter in the postiodization phase: iodine status, thiocyanate exposure, and autoimmunity. Clin Endocrinol (Oxf) 2003; 59: 672 – 681.
17. Golden SH, Robinson KA, Saldanha I, Anton B, Ladenson PW. Prevalence and incidence of endocrine and metabolic disorders in the United States: a comprehensive review. J Clin Endocrinol Metab 2009; 94: 1853 – 1878.
18. Cooper DS, Halpem R, Wood LC, Levin AA, Ridgway EC. L – thyroxine therapy in subclinical hypothyroidism: a double – blind, placebo – controlled trial. Ann Intern Med 1984; 101: 18 – 24.
19. Biondi B, Fazio S, Carella C, Sabatini D, Amato G, Cittadini A, *et al*. Control of adrenergic overactivity by beta – blockade improves the quality of life in patients receiving long term suppressive therapy with levothyroxine. J Clin Endocrinol Metab 1994; 78: 1028 – 1033.
20. Bensor I, Goulart AC, Loutufo PA, Menezes PR, Scazufac M. Prevalence of thyroid disorders among older people: results from the Paulo Aging and Health study. Cad Saude Publica 2011; 27: 155 – 161.
21. Chubb SA, Davis WA, Davis TM. Interactions among thyroid function, insulin sensitivity, and serum lipid concetrations: The Fremantle diabetes study. J Clin Endocrinol Metab 2005; 90: 5317 – 5320.
22. Raboudi N, Arem R, Jones RH, Chap Z, Pena J, Chou J, *et al*. fasting and postabsorptive hepatic glucose and insulin metabolism in hyperthyroidism. Am J Physio 1989; 265: E 159 – E 166.
23. Smithson MJ. Screening for thyroid dysfunction in a community population of diabetic patients. Diabet Med 1998; 15: 148 – 150.
24. Perros P, McCrimmon RJ, Shaw G, Frier BM. Frequency of thyroid dysfunction in diabetic patients: value of annual screening. Diabet Med 1995; 12: 622 – 627.
25. Shoukry , L. R. ., Mohamed , A. N. ., Sharaf , A. E. A. ., & Osman , O. B. S. . (2021). Diagnostic Markers for Early Detection of Neonatal Sepsis. Journal of Scientific Research in Medical and Biological Sciences, 2(3), 13-26. https://doi.org/10.47631/jsrmbs.v2i3.319
26. Owen PJ, Sabit R, Lazarus JH. Thyroid disease and vascular function. Thyroid 2007; 17: 519 – 524.