Comparison between Hypothyroidism and Hyperthyroidism in Teenage as Well As Adult Women Patients

Neelofer Latif [1], Seema rani[2], Aabid ahmad khanday,[3]

1. Student of medical microbiology at desh bhagat university mandigobindgarh .
2. Assistant professor at desh bhagat university mandigobindgarh .
3. Teaching assistant at desh bhagat university mandigobindgarh .

ABSTRACT.

Thyroid disorder is found to be most commonly occurring endocrine disorder in females. Thyroid hormones have an imperative position in metabolic methods in human body, and several physiological and pathological stimuli are known to influence thyroid metabolism. The increased incidence of hypovitaminosis D was diagnosed in population with hypothyriodism. Hypothyriodism and hypothesis are persistent situations which might be commonly handled in an outpatient putting and their control is closely reliant on biochemical testing, imaging and nuclear medication procedures. The study's goals are to identify the prevalence of hypothyriodism and hyperthyroidism in females and the relationship between vitamin D and hypothyriodism in adult female patients. In the present study we found 40. 96% diagnosed with hyperthyroidism and 59.04% with hypothyroidism. Total number of samples taken 105 in which hyperthyroidism is in 40.96% (n=43) and hypothyriodism is in 59.04 % (n=62). The prevalence of hyperthyroidism is 42.70% (n= 41) and hypothyriodism is 57.3 %(n=55) in adults. We could not find significant association between Vitamin D and hypothyroidism ($p>0.05$), patients with hypothyroidism 73.3% (n=22) have low level of Vitamin D while 26.6% (n=8) of population have normal level of Vitamin D. We could not find significant association between Vitamin D and hypothyroidism ($p>0.05$). Study concluded that prevalence of hypothyroidism is higher in adults and old women than hyperthyroidism and hypothyroidism have no significant role in lowering the levels of Vitamin D but weal so emphasize the fact that Vitamin D should be done as routine investigation in healthy as well as hypothyroidism patients as its value was also less in control subjects.

INTRODUCTION

One of the major endocrine glands in the neck is the thyroid gland. It has two lobes the right lobus dexter lobe and the left lobus sinister lobe that are connected by an isthmus, giving it the appearance of a butterfly. It is situated on the front side of the neck, rubbing up against and encircling the larynx and

trachea before extending behind and reaching the gastro and carotid sheath (Fig.1). It starts cranially at the oblique line of the thyroid cartilage, just below the Adam Apple or larynx prominence, and diminishes inferiorly up to the fifth or sixth tracheal ring. It is made up of around 1 million circular follicles on the inside, and follicle cells, elongated and squamous epithelial cells, comprise the walls of each follicle. Due to the structure of the thyroid cartilage, the thyroid gland acquires its name from the Greek word "shield" (1). Iodine deficiency prevents the thyroid gland from producing thyroid hormones, which causes it to enlarge and eventually become a non-toxic pituitary adenoma. Thyroxine(T4) and triiodothyronine (T3) are thyroid hormones secreted by the thyroid gland. In order to produce the biologically important thyroid hormone triiodothyronine, the thyroid gland's principal secretory product, thyroxine (T4), causes local deionization in peripheral tissue. The thyroid hormones are crucial for controlling the metabolic rate. They have an impact on the development and function of numerous different systems in the body. Iodine and tyrosine are used to make the hormones triiodothyronine (T3) and thyroxine (T4). The anterior pituitary gland secretes Thyroid Stimulating Hormone (TSH), which regulates the thyroid gland's hormonal activity. The brain's hypothalamus releases thyrotropin-releasing hormone (TRH), which on its own regulates the anterior pituitary gland. In India, diabetes is the most common endocrine illness, with thyroid disorders coming in second. Three hundred million individuals worldwide suffer from thyroid diseases, with approximately forty-two million of them living in India, according to a latest report. Thyroid problems are more common and severe in women than in men. At some point in their lives, one in every eight women is at risk for thyroid disease. Sometimes the real reason isn't clear. Estrogen and progesterone may have a role in the higher prevalence in females. Both hypothyroidism and hyperthyroidism have been linked to an increased risk of coronary heart disease, and thyrotoxicosis has shown detrimental in terms of osteoarthritis risk. The thyroid diseases are metabolic conditions that comprise thyroid glands that have abnormally increased (hyperthyroidism) or decreased (hypothyroidism) activity. Figure 2 shows the normal and hyperactive thyroid.

The term "hyperthyroidism disorder" refers to a condition in which the thyroid gland produces excessive amounts of the hormones triiodothyronine and thyroxine as well as thyroid stimulating hormones below the reference level. Heart palpitations, a rapid heartbeat, increased sweating, body weight loss, difficulty breathing, diarrhea, and tremors are among the common symptoms of hyperthyroidism. When a patient has hyperthyroidism, anti-thyroid medications are used to reduce thyroid hormone synthesis. Additionally, it's not uncommon for people with hyperthyroidism to match the diagnostic criteria for brain conditions. Hyperthyroidism frequently exhibits symptoms that are consistent with psychological disorders. At the identical time, human beings with hyperthyroidism will probably gift signs and symptoms along with anxiety and different autonomic signs and symptoms that would resemble a mental illness. Graves' disease is the primary cause of hyperthyroidism. The autoimmune disorder is brought on by an active antibody

directed even against thyroid-stimulating hormone (TSH) receptors, which causes the thyroid gland to overproduce and secrete thyroid hormone. It might run in families and be linked to other autoimmune diseases. The reason, severity, age, goitre size, associated diseases, and treatment

preferences of the patient all affect how hyperthyroidism is treated. The aim of treatment is to reverse the hypermetabolic condition with the least amount of side effects and hypothyriodism occurrence. The term "hypothyroidism disorder" refers to a condition in which the thyroid gland's function is diminished due to insufficiency of the thyroid hormones triiodothyronine and thyroxine and increased production of thyroid stimulating hormone. Hypothyroidism is a common condition in old population, 3–8% of men and 5–20% of women are affected. The level of thyroid dysfunction influences the severity of hypothyroidism. This form of thyroid impairment is the most prevalent, with a prevalence of 3 to 8% in the inhabitants and predicted to increase as the aging people. Women are ten times more probable than males to have hypothyroidism. All organ systems may be affected by hypothyroidism, and how much hormone shortage there is will determine how it affects each system. According to a study, women who have overt or subclinical hypothyroidism are at an increased risk of developing high blood pressure during conception, premature and recurrent miscarriage, inability to breastfeed, and adverse new-born outcomes, including mental illness and inherited differences. Low iron levels can also be a side effect of hypothyroidism due to poor intestinal absorption caused by low levels of digestive acids and enzymes or due to linked autoimmune conditions such celiac disease. Additionally, it will be as a result of some girl patients' excessive mensuration. Due to the rise in estrogen, which has an anti- thyroid effect, women with hypothyroidism comprise a comparatively large percentage of women with thyroid disease as they reach reproductive age. Indeed, the range and proliferative activity of ethmoid cells in the bone marrow are decreased in hypothyroid patients due to lower plasma erythropoietin levels, which leads to a slower metabolic rate in hypothyroidism due to reduced oxygen diffusion to tissues in the absence of thyroid hormones. This condition is associated by anaemia. Thyroid abnormalities are autoimmune conditions that can lead to the occurrence of other autoimmune conditions (28). The serum lipid profile, in especially the serum cholesterol level, was the main factor used to diagnose thyroid hormone deficiency in the beginning of the twentieth century (29). There is established research on whether dyslipidemia in hypothyroidism may eventually result in cardiovascular disease, and it is widely acknowledged that there is an association between lipid profiles and hypothyroidism (30). The elevated prevalence of sub- clinical hypothyroidism can also be attributed to other characteristics, including as gender, age, and ethnicity (31) and the general consensus is that thyroid issues and diabetes mellitus are prevalent in the elderly. The probability of thyroid dysfunction is increased by having diabetes mellitus. Shoib, et. al., in 2021 study was done with the sample size of 150 in which 75 patients with hyperthyroidism and 75 of euthyroid within the age group of 20 – 70 years and all studied subject are female. 45 patients of hyperthyroidism which is 60% population

showed signs of a psychiatric disorder. Hence concluded participants showing symptoms and disorder should be provided with timely care and improvement in quality of life and go through routine screening (32). Dr. Sreelatha, et. al., in 2020 worked with a 100-person sample size on adolescent girls in specific Pakala locations. Out of 100 girls 55 girls had moderate knowledge, 24 girls had inadequate knowledge and 21 girls had adequate knowledge. Study concluded that health education programs were needed to improve the awareness of hypothyroidism's effects among teenage girls, causes, risk factors, signs and symptoms (33). The 2020 project was hospital-based and executed in Birgunj's central laboratory at the national medical college and teaching hospital in collaboration with the department of biochemistry, Shamsher et al. A total sample of 7040 people was employed to assess thyroid function during July 2017 and Dec. 2019. The chemiluminescence immunoassay (CLIA) technique was used to measure TSH, fT4 and fT3 from a sample of venous blood. Thirty percent of the sample of 7040 people have thyroid dysfunction, with 13% of them having subclinical hypothyroidism, 8% having overt hypothyriodism, 4% having preclinical hyperthyroidism, and 5% having overt hyperthyroidism. The age range between 16 and 30 is represented by the bulk of samples, followed by 31 to 45. High prevalence of overt and subclinical hypothyriodism, according to the study. Females make up a larger percentage than men (34). There is an increased concentration of hypothyriodism among adult female thyroid disease patients, according to recent studies. But there is a lack of data for teenage patients. For all these reasons, the present study has been conducted to Compare between Hypothyriodism and hyperthyroidism in teenage as well as adult women patients

MATERIAL AND METHODS

Place of Study: This study was performed in "Department of Biochemistry" in Sofi research and clinical center Anantnag Jammu and Kashmir.

Type of study: A cross-sectional descriptive study**.**

Sampling

After an overnight fasting of 12-14 hrs. about 5ml of whole blood sample was drawn by venipuncture from each female and placed in Plain vacutainer (clot activator tube). After the clot formation in the collected blood has occurred, the blood sample was centrifuged for 15 min at 3000 rpm (Revolutions per minute). Serum was separated and aliquots of serum were then made and stored at -20C till further biochemical analysis was done.

. sampler – A total of 5 samples can be placed in each rack. Each sample tube has barcode which gives each sample a unique ID and every rack also has barcode on it. Racks are loaded onto the tray. A tray can hold a maximum of 15 racks.

• Sample/reagent (S/R) probe - The S/R probe transfers sample and reagents to their destined positions in the analyzer. The S/R probe is joined on the S/R arm. Arm moves the probe between the sample rack and the pipetting station. Liquid level is detected using capacitance measurement. Pressure transducer is used for clot detection. Disposable assay tips are used by S/R probe to avoid sample carryover.

Barcode card reader station

Components of sample area

Reagent area components

Reagent rotor - The reagent rotor contains 18 positions for assay, diluents, or pre- treatment reagents. The reagent rotor is temperature controlled at 20 ± 3 °C

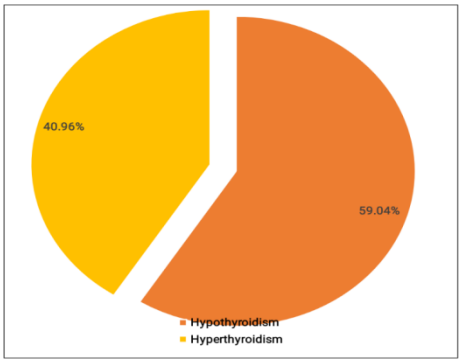
Cap opener - A cap opener is used by reagent rotor which reduces evaporation and contributes in easy use. The cap opener is located on the back wall of the reagent rotor compartment. After pipetting or mixing is done reagent caps are again closed. Microbead mixer - It mixes the microbeads before aspiration to make sure that the suspension is homogenous. It is positioned between the S/R probe and reagent rotor.

RESULTS

Comparison between Hypothyroidism and hyperthyroidism in female patients:

We recruited (n=105) patients out of which 40.96 (n=43) were diagnosed with hyperthyroidism and 59.04 % (n=62) were diagnosed with hypothyroidism.

The prevalence of hyperthyroidism is 42.70% (n= 41) and hypothyroidism is 57. %(n=55) in adults



Comparison between Hypothyroidism and Hyperthyroidism

The study was based on comparison of two groups, hypothyriodism patients (n=30) and healthy control patients (n=30) in female population within the age group of 18-65 years. The result of study revealed that the population with hypothyroidism, 73.3% (n=22) has low level of Vitamin D while 26.6% (n=8) of population have normal values of Vitamin D. No significant association was found between the Vitamin D values of both the groups (p>0.05).

Thyroid profile and Vitamin D values in Hypothyriodism and control patients

Parameters	T3(unit)	T4 (unit)	TSH (unit)	Vitamin D (L)	Age (years)
Hypothyriodism patients (n=30)	71.1±39.6	5.6±2.7	33.2±54.9	32±14.6	41.1±12.0
Healthy control patients (n=30)	79.3±40.9	6.7±2.8	2.6±1.3	26.7±20.8	39.4±12.9
p-value	0.43	0.11	0.004*	0.44	0.59

DISCUSSION

In this study we did a comparison between hypothyroidism and hyperthyroidism in adult and teenage thyroid patients. And we found that the prevalence of hypothyroidism is more as compared to hyperthyroidism patients. As compared to their control counterparts, hyperthyroid and hypothyroid patients in the current study had thyroid stimulating hormone concentrations that were significantly lower and higher, respectively. These results were consistent with those of other populations studied by Noran and Hedef (2005) and Purohit et al. earlier (2012) (101,102). In the study, hyperthyroid patients had higher total cholesterol, triglyceride, and very low hdl levels than healthy controls. For total cholesterol, comparable findings from earlier investigations have been presented (58). There have been conflicting findings suggesting hyperthyroid individuals have lower concentrations of high-density lipoproteins and low-density lipoproteins than controls (100). In this investigation, we also compared the vitamin D levels in individuals with hypothyriodism to those in the control group. Both populations have comparable levels of vitamin

D. Therefore, there is no real worth.

CONCLUSION

According to the results of the current study, hypothyroid disorders were more common than hyperthyroid disorders, and females were affected by thyroid problems at a higher rate than their male colleagues. The only explanation for these findings is that an iodine deficiency (hypothyroid disease) slows down the generation of thyroid hormones and causes abnormalities in the body's mental, physical, and hormonal development. Compared to men, a woman's body is more likely to react to certain hormonal changes. Between the time of diagnosis and the end of the second follow up, thyroid drugs were noticeably more effective at bringing the value of thyroid stimulating hormone into normal range in thyroid patients. An autoimmune condition called thyroid disease makes other autoimmune diseases more likely to develop. Early thyroid dysfunction diagnosis and therapy can lower blood pressure, blood sugar levels, body mass index which further lowers the chance of developing additional disorders. In despite the fact that our study found that hypothyriodism had no discernible impact on vitamin D levels, we nonetheless stress the need for screening tests for both healthy individuals and hypothyriodism patients because vitamin D levels were also lower in the control group. Additionally, we advise all hypothyriodism patients to get sun exposure to avoid vitamin D insufficiency. Because it is simple to follow and sunshine is a significant source of vitamin D

REFERENCES

1. Bose A, Sharma N, … NH-IJCMA, 2015 undefined. A hospital based prevalence study on thyroid disorders in Malwa region of Central India. ResearchgateNet [Internet]. 2015;4(6):604–11. Available 7/publication/305210154_A_hospital_based_prevalence_study_on_Thyroid_Disorders_in_Malwa_r egion_of_Central_India/links/5784e46708ae37d3af6da831/A-hospital-based-prevalence-study-on-Thyroid-Disorders-in-Malw3. 1061.pdf.

2. Unnikrishnan A, Menon U. Thyroid disorders in India: An epidemiological perspective. Indian JEndocrinol Metab. 2011;15(6):78.
3. Fare brother J, Zimmermann MB, Andersson M. Excess iodine intake: sources, assessment, and effectson thyroid function. Ann NY Acad Sci.
4. Bjoro T, Holmen J, Kruger O, Midthjell K, Hunstad K, Schreiner T, et al. Prevalence of thyroid disease, thyroid dysfunction and thyroid peroxidaseantibodies in a large, unselected population. The Health Study of Nord- Trondelag (HUNT). Eur J Endocrinol [Internet]. 2000 [cited 2022 Aug 13];143(5):639–47. Available from: https://pubmed.ncbi.nlm.nih.gov/11078988/
5. Svare A, Nilsen TIL, Bjøro T, Åsvold BO, Langhammer A. Serum TSH related to measures of body mass: Longitudinal data from the HUNT Study, Norway. ClinEndocrinol (Oxf).2011;74(6):769–75.
6. Kim B. Thyroid hormone as a determinant of energy expenditure and the basalmetabolic rate. Thyroid. 2008;18(2):141–4.
7. Thyroid and Weight | American Thyroid Association [Internet]. [cited 2022 Aug13]. Available from: https://www.thyroid.org/thyroid-and-weight/
8. Garin MC, Arnold AM, Lee JS, Tracy RP, Cappola AR. Subclinical hypothyriodism, weight change, and body composition in the elderly: the Cardiovascular Health Study. J Clin Endocrinol Metab [Internet]. 2014 [cited2022 Aug 13];99(4):1220–6. Available from: https://pubmed.ncbi.nlm.nih.gov/24432998/
9. Agnihothri R V., Courville AB, Linderman JD, Smith S, Brychta R, Remaley A, et al. Moderate Weight Loss Is Sufficient to Affect Thyroid Hormone Homeostasis and Inhibit Its Peripheral Conversion. Thyroid [Internet]. 2014 Jan1 [cited 2022 Aug 13];24(1):19. Available from: /pmc/articles/PMC3887425/

10. Unal E, Akın A, Yıldırım R, Demir V, Yildiz İ, Haspolat YK. Association of Subclinical Hypothyriodism with Dyslipidemia and Increased Carotid Intima-Media Thickness in Children. J Clin Res Pediatr Endocrinol [Internet]. 2017 [cited 2022 Aug 13];9(2):144. Available from:/pmc/articles/PMC5463287/
11. Kattaria SK, Joya H, Dhadich A. A study of anthropometric parameters , skin and its appendages in hypothyroid patients in Western Rajasthan Population.2014;3(10):88–93.
12. BUDHALAKOTI N, KULSHRESTHA K. Hypothyriodism, its association with body composition, anthropometric measurements and physical activity levels. FOODSci Res J. 2015 Apr 15;6(1):67–75.
13. Dai H, Zhang L, Han X, Zhao H, Guo J, Li Z, et al. Body mass index (BMI) is associated with serum thyroid-stimulating hormone (TSH) level in infertile women: a cross-sectional study. Endocr J [Internet]. 2020 [cited 2022 Aug 13];67(9):923–8. Available from: https://pubmed.ncbi.nlm.nih.gov/32418923/
14. Michaelsson LF, La Cour JL, Medici BB, Watt T, Faber J, Nygaard B. Levothyroxine/Liothyronine Combination Therapy and Quality of Life: Is It Allabout Weight Loss? Eur Thyroid J. 2018 Oct 1;7(5):243–50.