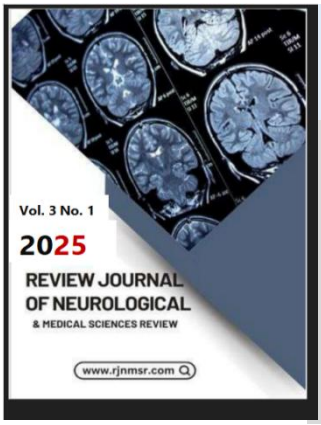

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The Prevalence of Hyperthyroidism and Hypothyroidism in Thyroid Patients from Nimra Cancer Hospital, Jamshoro, Sindh, Pakistan

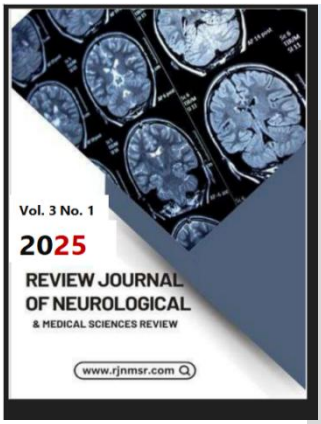
Maryam K. K[1]
Department of Zoology, Government College, University, Hyderabad, Pakistan
Bakhtawar Soomro[2*]
Department of Zoology, Government College, University, Hyderabad. Pakistan. Corresponding Author Email: bakhtawarsoomro145@gmail.com
Dua Maryam[3]
Department of Zoology, Government College, University, Hyderabad, Pakistan
Umar Rashid[4]
Lecturer, Department of Zoology, Division of Science and Technology, University of Education, Lahore, Punjab, Pakistan

Abstract

Patients and the general population with Metabolic Syndrome (MetS) bear a heavy burden of thyroid problems. To assess these ailments, present research work focuses to calculate the incidence, prevalence and impact of hyper- and hypothyroidism in MetS patients treated at Nimra Cancer Hospital. **Objectives:** The aim and objectives of present research was to calculate the frequency of these conditions and their effects on patients' overall health. The study highlights the importance of early detection and management of thyroid problems. By exploring the relationship between thyroid disorders and cancer treatment, this research work contributes significantly to the existing knowledge in this domain. **Methods:** Around 120 thyroid patients at Nimra Cancer Hospital were randomly observed and the data was collected from patient records and through interviews. **Results:** The average age of patients observed with thyroid problems was 44.4, and there were 50 (41.6%) men and 70 (58.3%) women found inflicted with thyroid problems. Out of 120 patients, 40 patients (33.3%) diagnosed with hypothyroidism and 80 patients (66.6%) with hyperthyroidism respectively. **Conclusion**: Patients with MetS had a significant frequency of both hypothyroidism and hyperthyroidism issue. However, patients with primary hyperthyroidism tended to be older and more often observed were male.
Keywords: Prevalence, Metabolic syndrome, Hypothyroidism, Hyperthyroidism

Introduction

Some endocrine glands respond directly to metabolic glands; the majority is regulated by hormones secreted from the pituitary gland. Endocrine illnesses are



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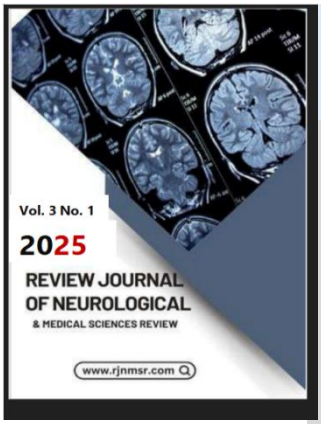
widespread, especially those of the thyroid gland (Longo, D. and Facui, A. *et.al.,* 2011). Substances made in the hypothalamus and released into the portal of blood, which drains directly down to the pituitary stalk, govern the secretion of the pituitary hormone in turn. According to the traditional theory of endocrine function, hormones produced in endocrine glands are released into the bloodstream and different locations from where they are secreted. Thyroid disorders are widespread, affecting (5%) of the population, mostly women. Since, practically all nucleated cells have a thyroid axis that regulates cellular development and metabolism, abnormalities of thyroid function can appear in a variety of ways. Thyroid hormones have a significant impact on metabolism. Thyroid disorder has a pronounced effect on increased energy consumption. (Williams, N.S. and Christopher, J. K. *et.al.,* 2008). Thyroid gland dysfunction is most common in endocrine diseases. Pituitary gland directly controls most of the hormones and few of the hormones are indirectly controlled by metabolic glands (Xu, C. and Yang, X. *et.al.,* 2012). The endocrine diseases are growing throughout the world but in Asia the prevalence of endocrine diseases are much higher (Shrestha, N. J. 2007). The deaths in Nepal are about 0.2% due to endocrine disorders and iodine deficiency is the major cause of deaths Raymond, C. 2012). Numerous thyroid conditions share a pathophysiology that involves TSH, T3, and T4. TSH is the most significant chemical indicator of thyroid function. Low levels of TSH cause hyperthyroidism, while higher levels cause hypothyroidism (Rolleston, H. 1936). Thyroid surgery is being done since early 19th century. The need of this surgery is visually detected by the fullness or swelling of neck from thyroid enlargement. The identification of thyroid gland has been credited to Wharton (1656), but its endocrine activity was not identified until approximately two hundred years afterward by King, T. in 1836. The identification of nine thyroid-associated clinical disorders is attributed to Wharton's discovery (Wartofsky, L., 2010). The thyroid cancer and diffused toxic goiter in 1811, Grave's disease in 1835, Cretinism in 1871, Myxedema in 1874 and Hashimoto disease were identified in 1912. However, the arrangement of thyroxine (T4) in (1926), thyroiditis in (1936), recognition of triiodothyronine (T3) was done in 1952 and 1956. The existence of thyroid stimulating antibodies resulting in Grave's disease was confirmed by the presence of thyroid autoantibodies in Hashimoto's disease which was discovered in 1957). Furthermore, gratitude of medullary thyroid carcinoma was detected as an individual disease in 1959 (Wartofsky, L. 2010).

In 1967, the first explanation of thyroid hormone resistance was done confirming that peripheral mono-deiodination of (T4), then the main source of circulation (T3 in 1970), classification of T3-binding receptors in tissues (1972), postpartum thyroiditis with hypothyroidism or thyrotoxicosis mechanism observed from 1976 to 1977. It demonstrates that hormone conflict in (1989) and (1990) was caused by tip transformation in the thyroid-hormone receptor, the thyrotropin (TSH) receptor was duplicated in (1989), (Cuschieri, A. and Steele, J.C. *et.al.,* 2002). Since, then research has identified a mutually interdependent function; alteration in the (TSH) receptor that accounts for malfunction. The development of human recombinant (TSH) (rhTSH), a (TSH) subunit, and the cloning of the gene has been produced and



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found to be excellent diagnostic and therapeutic tool (Emerson, C. H. and Torres, M. S. *et.al.,* 2003).

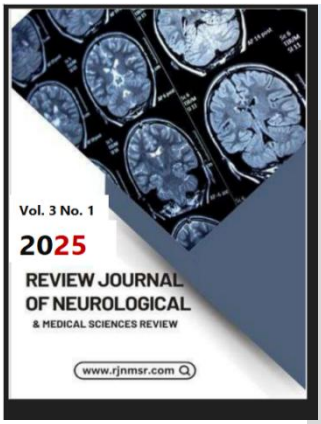
Iodine, a scanty component, is expected for bioactivity in the blend of T3 and T4. They are made as a part of the very huge forerunner thyroglobulin (Tgb), are kept in a colloid state inside the cell, and (T4) is incidentally changed over completely to (T3). Thyroglobulin has a sub-atomic load of 660 KDa and about 5000 amino acids. It is a sizable iodinated, glycosylated protein. Iodide makes up around 0.21% of Tgb's weight and sugars make up generally 810% Tg contains around 30% of its iodide in the iodothyronyl residues (T4 and T3), and about 70% of it is in the form of inactive precursor's monoiodothyronine (MIT) and diiodothyronine (DIT). The thyroid organ is comprised of two essential cell types: (1) follicular and (2) parafollicular cells. The follicle, which is the thyroid's crucial useful unit, is comprised of a solitary layer of cuboidal (follicular) cells enclosing an assortment of colloid (Murray, R. K. and Granner, D. K. *et.al.,* 2006).

Material and Methods

This analytical and cross-sectional research was executed out at NCH (Nimra Cancer Hospital) from the 3rd of March 2023 to 15 of May 2023 to determine the prevalence of hyperthyroidism and hypothyroidism in a sample of thyroid patients and to analyze the demographic and clinical characteristics associated with hyperthyroidism and hypothyroidism. 366 people visited the department, 215 of them were female, and 151 were male. 120 patients were recorded in total visit among the various Out Patient Departments (OPD). Out of these, 50 male and 70 females were reported. There were overall 80 referral cases for thyroid testing from these departments, out of them, 40 had been identified as newly diagnosed thyroidal dysfunction. Out of all female patients 20 were pre-menopausal 15 were pregnant, 35 had diabetes, renal, liver, bone, or other illnesses that prevented them from participating in this study. Patients ranging 1–80 years old, both male and female, were included in the study. The study did not include patients with chronic medical conditions such as *Diabetes mellitus*, hypertension, or heart issues. Patients who were undergoing thyroid surgery were also excluded. Thyroxine-taking patients were not included in this investigation. The patient's information was gathered utilizing a well-designed data entry form. Each patient was informed before taking into study (consent was taken) either personally or through attendant.

Questionnaire

S. No.	Personal information
1.	Patient's Name
2.	Year of Age
3.	Marital Status (Male)
4.	Marital Status (Female)
5.	Total number of Children's
6.	No. of Lacting Children
7.	No. of Non-Lacting Children
8.	Weight



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9.	**BMI**
10.	**Height**
11.	**History of Family Thyroid Issue**
12.	**No. of patients recorded with Hypothyroidism**
13.	**No. of patients recorded with Hyperthyroidism**

Results and Discussion

During the study period, which lasted from March 3, 2023, to May 15, 2023, a total of 120 cases were identified. For the intent of determining factors which include: age, gender, frequencies, locality, and other clinical data was recorded. 50 males and 70 females with thyroid-related disorders were reported. The thyroid, liver, and kidney biochemical profiles of patients were investigated in tandem with authorized Annexure I. Statistically observation reflected 41.6% men and 58.3% were women inflicted with thyroid issue. These findings revealed that thyroid dysfunction is more frequent in women.

Age was separated into seven equally sized groups, ranging from (10 to 75). As seen in table 1, 6.66% of all cases were patients in the first age category or those under 20 years old. However, 12.5 %, 20.8%, 18.3%, 25.8% 8.3%, and 7.5% of the patients are in the third, fourth, fifth, sixth, and seventh age groups, respectively.

Table 1: The Prevalence of Hyperthyroidism and Hypothyroidism in Thyroid Patients Recorded

S. no	Patients Age	Frequency of patients	Percentage (%)
1.	**< 20**	**(8)**	**(6.66 %)**
2.	**21-30**	**(15)**	**(12.5 %)**
3.	**31-40**	**(25)**	**(20.8 %)**
4.	**41-50**	**(22)**	**(18.3 %)**
5.	**51-60**	**(31)**	**(25.8 %)**
6.	**61-70**	**(10)**	**(8.3 %)**
7.	**> 70**	**(9)**	**(7.5 %)**
Total	**-**	**(120)**	**(99.86 %)**

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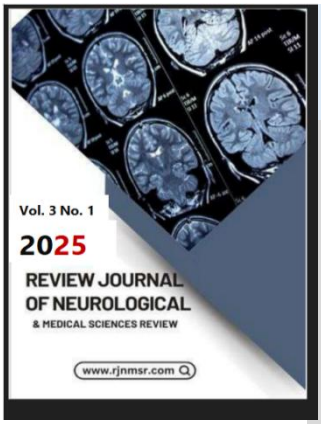
Photograph 1 (Left): Observed hypothyroid patient (Photograph 2 (Right): Observed hyperthyroid Patients

This study aimed to evaluate the prevalence of clinical diagnoses with age groups and gender, as well as (TSH, T3, and T4) values with thyroid impairment. This study additionally illustrates noteworthy lipid profile, renal, and liver functioning testing in hyperthyroid and hypothyroid patients. (Murray, R. K. and Granner, D. K. *et.al.,* 2006). The data for hypothyroidism and hyperthyroidism are compared in this study. To accomplish the main objective and comprehend the study's goals, mean values and frequencies were computed. This study's primary goal was to determine the deeper causes associated with various thyroid function issues and how they affect liver and kidney health by considering a few key biochemical indicators, such as serum CTN and ALT activity. To establish the scientific relationship between the aforementioned medical diseases, a study was done on a group of individuals with similar conditions. This study is in line with the findings of the pervious Sisk study in which ladies were more likely than males to have thyroid problems (Sisk, J. 2002). According to this study's findings on the demographic characteristics of the patients, ladies are fundamentally more probable than men to experience thyroid abnormalities (41.6% vs. 58.3%).

In another study from Mardan, diagnoses were made for the prevalence of 195 cases of hyperthyroidism with (32.5%) and 191 cases of hypothyroidism with 31.8% cases individually out of 600 selected Visitors. A total of 229, (38.83%) were subjected to hyperthyroid (13.7%) and 11.3% of hypothyroid issue. A total of 41 (6.83%) patients were integrated in the current study from the (District Mardan). Out of these 12 (2.33%) and 18 (3%) were also Hyperthyroid and Hypothyroid respectively.

The distribution of the participants (both male and female) is shown in Figure 1 with the subjects' ages broken down into seven categories. This study also aids in determining if dysfunctions is more prevalent in the male or female population across a range of age groups displayed in (Table 1) most of the cases with (20.8%) presenting with thyroid abnormalities are in the age gathering of (31-40 years).



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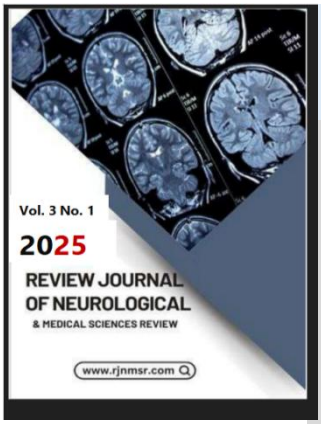
Whereas, just (7.5%) were found in the age of 70 or more. Frequent prevalence of thyroid discontinuing in patients falling into the age group (31-40) years may be because of hyperactivity of hormones for example; estrogen and progesterone. Furthermore, results regarding age dispersion of the included subjects showed that these thyroid problems happen for the most part exist among age group of (31-40) years, which may be the most effective age limit for efficiency and where the previously mentioned hormonal changes and related movement is at top. In comparison to age group of young adults, there were quite lesser number of patients presented with such disorders, i-e., prevalence of 22 and 2 exclusively for individuals aged (60 to 70) and older, respectively. This may be due to changes in geriatrics and decreased sexual hormone activity. These findings concurred with those of the (Pandey, R. and Jaiswal, S. *et.al.,* 2013) contrasted with those of the study (Tayal, D. and Chawla, R. *et.al.,* (2009).

These discoveries show that hypothyroidism fundamentally influences lipid digestion, especially in patients with raised (TSH) levels, which are predictable with past exploration showing the way that even a little expansion in (TSH) can bring about significant changes in lipid profile (Serter, K. and Dermidas, B. 2004). In moderately aged ladies, hypothyroidism is additionally connected to an expansion in absolute cholesterol (Alexander, J. G. H. 1999). In this way, hyperlipidemia is an immediate consequence of hypothyroidism, which the ongoing concentrate likewise upholds. Atherosclerosis and coronary vein illness are brought about by changes in complete cholesterol and lipoprotein cholesterol levels, in spite of the fact that there is at present no proof connecting hypothyroidism to coronary illness (Miura, S. and Iitaka, M. *et.al.,* 1994). By acquiring improvement in the adjusted states of lipid boundaries set apart by typical or raised (TSH), (LDL-C), and reduced (HDL-C) values after getting the recommended amount of thyroxin obliteration hypothyroidism is affirmed to be related with lipid illnesses (Miura, S. and Iitaka, M. *et.al.,* 1994). In contrast to hyperthyroidism and hypothyroidism (Prakash, A. and Lal, A. K (2006) and (Constantini, F. and Pierdomenicos, D. *et.al.,* 1998). Prakash and Constantine's research indicates that the hypothyroid condition is linked to lowered HDLC levels and raised TC, TG, and LDLC levels. Injury to the liver is a common condition that results in hyperthyroidism (Bayraktar, M. and Van, T. D. H. 1997) and (Fong, T. L. and McHutchison, J. G. *et.al.,* 1992). A critical expansion in serum (ALT) levels was seen in (20%-30%) of people with Grave's sickness, which might be connected with an expansion in interest in hepatic oxygen without a commensurate increase in hepatic blood flow. The thyroid hormone levels of the hypothyroid people showed a significant variance. Hepatic myopathies may be the cause of cholesteric jaundice and high ALT levels, which are associated with hypothyroidism (Arora, S. and Chawla, R., *et.al.,* 2009). Serum ALT and (TSH) were directly correlated in other investigations. Additionally, serum (ALT) and (T3 and T4) have an antagonistic interaction (Targher, G. and Mantagnant, M. *et.al.,* 2008). Overall, it has been claimed that a rather high blood (ALT) concentration is strongly associated with hypothyroidism (Bayraktar, M. and Van, Thiel, D. H. (1997), (Christ-crain, M. and Huber, P. R. 2004) and (Malik, R. and Hodgson, H. 2002).



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Conclusion

In patients, hypothyroidism and hyperthyroidism were found very common. Our patients with primary hypothyroidism tended to be older and mostly female. Population-based research needs to be conducted in order to confirm these two observations. The 120 patients in this diagnostic cross-sectional study were reported at the Nimra Cancer Hospital in Jamshoro, Sindh, Pakistan. This study makes it abundantly clear that thyroid hormones have a profound impact on the body's numerous systems. As a result, clinically significant result is reached, recommending careful adherence to biochemical criteria for the management of the affected individuals. This may lead to an enormous decrease in the complications of associated metabolic diseases of the liver, kidney failure, and coronary heart disease. Liver and kidney damage can occur as a result of hyperthyroidism or hypothyroidism. The findings support the hypothesis that this link may open up new directions for studying the pathogenesis and treating individuals who have mild to moderate problems in nearby organs or systems. The study also compares participant locations with the mean values of the laboratory results. The results of this study will be useful in determining the causes of thyroid diseases in patients of either gender and of any age group, regardless of location in future studies. The complex interplay between these essential bodily functions and thyroid hormone necessitates the use of a multisystem approach in the diagnosis of clinical disorders affecting any organ.

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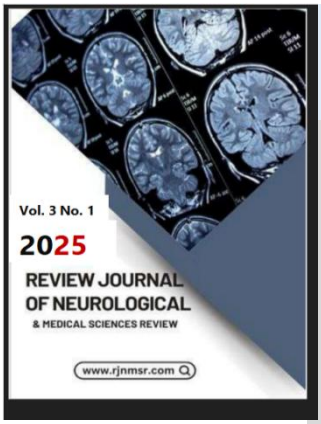

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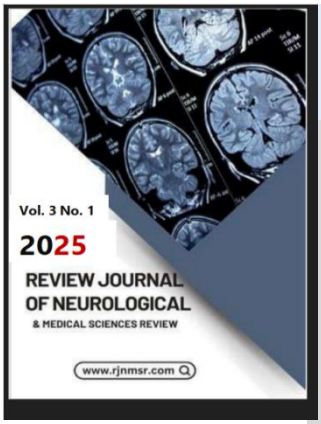

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