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**SYSTEMIC REVIEW**

# Sonographic Abnormalities of Thyroid Gland in pre and post-menopausal women

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## ABSTRACT

**Background:** Women that are over 50 years are usually diagnosed by thyroid disorders.
The prevalence of Thyroiditis, thyroid cancer, found more under postmenopausal women than premenopausal. In the postmenopausal phase the prevalence of biochemical (or subclinical) hypothyroidism rising from 10% to 20%, or increases steadily with age in women. The study results show an enlargement in the activities of Thyroid stimulating hormone among menopausal women.
**Aim:** To compare the sonographic findings of thyroid gland in before and after-menopausal women.
**Method:** An Analysis of scientific literature concerning the correlation of Sonographic abnormalities of thyroid gland in pre and post-menopausal women was done. Different platforms including medical journals, books and online resources (e.g., PubMed, Google Scholar & Medline) were explored to find the relevant data using the mesh Terms: Thyroid gland, premenopausal and postmenopausal women, etc. The main focus was given to the latest data published in the last 10 years.
**Key words:** Thyroid gland, premenopausal and postmenopausal women.

## INTRODUCTION

Post menopause is defined as no menstrual period for a year. The ubiquity of thyroid disarray enlargement with the aging, especially more in postmenopausal females. These symptoms like wetness, palpitations and sleeplessness can be present in both thyroid and ovarian disorders.[1] this explanation of thyroid function due to growing age effect, further co-morbidities, and the use of different types of pharmaceuticals related to these specific age groups makes decision more effortful. During the women fertile period there is a close connection between thyroid function and gonadal axes. The hormones of thyroid gland works collective with FSH through the FSH receptors which are present on granulosa cells and they produced progesterone hormone.[2] Over the age of sixty years there are the chances of many women to be diagnosed by Thyroid, who take gabapentin or clonidine and also take levothyroxine.[3] American College of Physicians has suggested, females of older age and above 50 years, have one or more than one common symptom that could be due to thyroid disorders should be screened with serum TSH testing initially, followed by measurement of FT4 if TSH level is undetectable or it may be higher of 10mIU/[4]. Thyroid nodules and cancer over the age of fifty years, mostly affect females; the therapeutic and diagnostic approach is similar as in normal people, but surgical risk and carcinomas prognosis is bad as in old aged patients than young patients[5].

Women may face a lot of anatomical and physiological changes in their whole lives, due to female sex hormones female's faces changes such as puberty, menopause, and pregnancy. Many Euthyroid hormones have effect on the functioning and development of reproductive system and in the body metabolism. Many Euthyroid diseases have main effect on females; and the incidence is 5-20 times more in women than in men.[6] the prevalence of Euthyroid disorders rises with the age of females. In the females, thyroid gland disorders are most common in worldwide, after diabetes. The Euthyroid disorders are mostly seen in middle aged and old aged postmenopausal women.[7] about 23.2% of subclinical thyroid disease are formed in women that re going through postmenopausal period; clinical thyroid disorders, about 2.4%. Between the group with subclinical Euthyroid disease, 26.2% (hyperthyroid), and 73.8% (hypothyroid).[8] Percentage of Euthyroid carcinoma increases with the age. These thyroid disease indications are clinically more difficult to differentiate, and may be similar to postmenopausal complaints. It is of importance that mild Euthyroid function failure can have multiple clinical symptoms on patients for example loss of memory, depression, and a various neuromuscular complaint.[9] Thyroid nodule (lump) is solid or liquid mass within the thyroid. These nodules are frequently observed in normal healthy population. It is a common reported finding on ultrasonography. Incidental findings of thyroid nodules are being reported in about 50% population. Most nodules are benign, but 3% to 7% cases are reported to be malignant[10].

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## LITERATURE REVIEW

The shape of Euthyroid gland just like butterfly that are present low in front of the neck and it found below the Adam's apple, along the front of the windpipe. Euthyroid gland has two side lobes, which is connected in the middle by isthmus. The Euthyroid gland releases many hormones, which are the (thyroid hormones). Main thyroid hormone is thyroxine, also called (T4). The Euthyroid gland have two main arteries for arterial supply: No One. Superior thyroid artery, No two. Inferior thyroid artery. The Ultrasound (US) test are often performed, by a linear transducer 4-cm-long. Additional planes can be explained through three-dimensional imaging, like

coronal carotid thyroid plane.[11] in older age, there is an Increase in prevalence of high levels of thyroid stimulating hormone, specifically in menopausal women - which are more than in men. The incidence of Euthyroid disease in group of menopausal women is as: (clinical thyroid disease), about 2.4%; (subclinical thyroid disease), about 23.2%. Between the group with subclinical thyroid disease, 73.8% (hypothyroid) and 26.2% (hyperthyroid). Incidence of Euthyroid carcinomas increases with the age as in post-menopausal women[12,13]. This study is conducted by SOLOMON BL, in 1993. We interviewed 300 white menopausal females (160 having thyroid disease, 140 having no thyroid disease) to consider whether, having thyroid disorders or taking thyroid hormone increased the prevalence of having a hip, vertebral, and forearm fracture. Thirty-seven (23%) females with the thyroid disease and 45(32%) women without thyroid disease had had a fracture, and there were no important differences among these groups in the type or number of fractures.[14] Morris MS in 2004, By the verification it concludes that the hyperthyroidism adversely affects bone, but this condition is possibly very occasional and likely it come up with little to postmenopausal osteoporosis. [15] In 2018 jan 1, Rubio GA study was conducted on , After menopause estrogen receptors can control growth in papillary thyroid cancer and may influence prognosis.[16] Solbiati L, in 1985 Radionuclide studies have, for many years, been the most commonly used imaging modalities in the evaluation of nodular abnormalities of Euthyroid gland. The prevalence of the various abnormalities in the population will be appraised as well.[17]In 2019, Bhagavan Reddy Kolanu investigate the study, which results significantly shows an increase in the activities of (thyroid stimulating hormone) between the old-aged menopausal females.[18] Rallison ML , in 1991 Following Euthyroid disorders , such as Hashimoto's thyroiditis, Graves' disease, thyroid neoplasms and nontoxic goiter occur more often in women rather than men and following their natural history has been seen in adults.[19] Ceresini G, conducted this study in 2008, ER are present in Euthyroid follicular cells in normal and in neoplastic tissue. We evaluated changes in total Euthyroid volume and volume of thyroid nodules in menopausal females given either hormone therapy (HT) or no treatment in a 1-year observational follow-up.[20] In all sonographic examinations a real-time sonography that has frequency 7.5-MHz, (linear transducer), (EUB 40, Hitachi) was used. Ultrasound of thyroid gland provides real time images.[21,22] In 2004 the study was conducted by Costante G who was working on Benign thyroid nodules that be a very ordinary disorder, which is still controversial.[23] This study was conducted by Marqusee E, in 2000, The clinical medicine encountered by a lot of hardships due to the thyroid nodules. Palpable thyroid nodules is found in adults by the ratio of 4% to 7% approximately, and on ultrasonography up to 70% thyroid nodules could be detectable, a lot of them are less than 1 cm in diameter.[24]This study was conducted by Xie C, in 2016 Many Euthyroid nodules are a commonly found in the general population, and these incidental thyroid nodules are often referred for evaluation on ultrasound (US). Ultrasound provides fast and a safe method for the examination of thyroid nodules.[25]This study was conducted by Kwon JH, in 2018, A woman of around the age of forty-five years had recently visited an endocrinologist, she has a family history of thyroid carcinoma but there is no any palpable thyroid nodules at physical examination. So she was referred to radiology department for sonography of the thyroid gland. Because of family history, patient had no other risk factors for thyroid carcinoma. Patients that have thyroid diseases, have effect on the entire thyroid gland, such as Graves' disease and thyroiditis, and usually own symptoms of (hyperthyroidism) or (hypothyroidism), neck tenderness, or alterations in thyroid size.[26] Müller HW, 1985 With the sonography of Euthyroid gland, echogenicity, shape, size and position of the organ are evaluated. It is evident that the level of echogenicity of Euthyroid gland is homogeneous and it has higher rate than that of surrounding muscle.[27]Faria CC, in 2019 Reactive oxygen species (ROS) are the most censorious class of free radicals or reactive metabolites produced by all living organisms. Reactive oxygen species (ROS) regulate several cellular functions through redox-dependent mechanisms, including proliferation, differentiation, hormone synthesis, and stress defense response.[28] This study was conducted by Muderris II, in 2011, Reproductive system of females can be effected by the thyroid hormones However, since ultrasonography became available, an increase in ovarian volume and Effect of Euthyroid HRT on ovarian volume and the androgen hormones in patients with untreated primary hypothyroidism[29]. This study was conducted by Wiersinga WM, in 2001 Euthyroid hormone replacement has been used for more than 100 years in the treatment of (hypothyroidism), and there is no chances of doubt about its overall efficacy[30]. In 2001 the study was directed by Gambacciani M. That contains the huge increase in body weight is usually seen in all climacteric period. And the menopausal changes of body fat and body weight had increasing attention in last few years. However both increased body weight and body fat are considered as independent medium of cardiovascular disorders in women[31]. Simeone JF, in 1982 conducted this study , The normal and abnormal thyroid glands can be visible with modern high-resolution real-time ultrasound equipment, Although in patients definitive use of this technique has not been thoroughly studied[32] Bogazzi F, in 1999 Hyperthyroidism is associated with hemodynamic changes including high output state, increased heart rate and cardiac contractility, and decreased peripheral resistance, that are related both to direct cardio stimulatory effects of thyroid hormone and to increased peripheral oxygen consumption. While cardiac parameters are invariably increased, as assessed by the shortening of systolic and diastolic time-intervals, the increase of systolic and diastolic function and the reduction in the left ventricular ejection fraction, regional blood flow distribution is not uniform in hyperthyroidism[33]. Reeder SB, in 2002, review the focused sonographic scanning techniques and sonographic features that may help in the effective localization of parathyroid adenomas within the patients with primary hyperparathyroidism.[34] Angerer P managed this study in 2001, the intention of this study was to conduct either HRT can slow progression of atherosclerosis, measured as intima-media thickness in the carotid arteries. The Carotid intima-media thickness is a proper intermediate end point to conduct clinically relevant effects on atherogenesis. In conclusion, at increased risk in postmenopausal women the time period of HRT around one year was not beneficial to slowing progression of subclinical atherosclerosis[35] Sajjadieh HR, conducted in 2005, the several thyroid disorders could be caused by thyroid nodules and it is common. However, mostly nodules are benign and about 5% to 10% of all palpable nodules are malignant. [36] The Thyroid tumors and carcinomas are three times more prevalent in woman than in men. Many studies demonstrated that, increased risk of many thyroid tumors was reported in old age women who took estrogens in postmenopausal stage. It has also been observed that this increased risk is associated with high dose of estrogen.[37]

Fig. 1: Transverse ultrasound image of the thyroid gland shows the single nodule in the right lobe. Longitudinal ultrasound image of the left lobe of the thyroid shows the three nodules in the left lobe of the thyroid.[38]

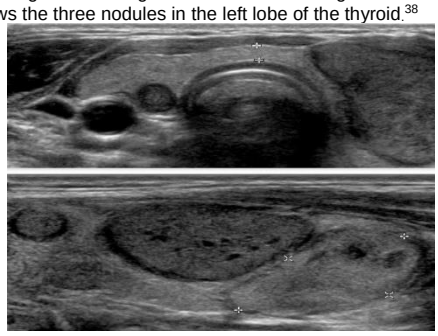


Fig. 2a shows thyroid nodules that appear purely cystic, or filled with fluid. 2b: Nodules that do not have smooth borders or have little bright white spots (micro-calcifications) on the ultrasound would make suspicious that there is a thyroid cancer present.[39]

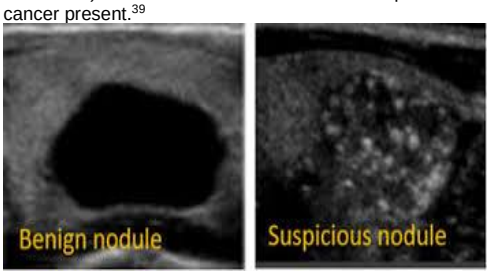
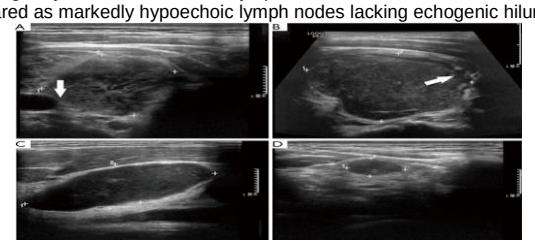



Fig. 3a Transverse image of ultrasonography showed nodular type of PTL. There was an irregular-shaped hypoechoic mass in the right lobe of the thyroid. The lesion had invaded the vascular wall,3b transverse image of ultrasonography showed a markedly hypoechoic mass in the left lobe of the thyroid with invasion of thyroid capsule.3c,3d longitudinal image showed pathologically confirmed involved lymph nodes in the left cervical III region appeared as markedly hypoechoic lymph nodes lacking echogenic hilum.[40]



## DISCUSSION

A thyroid nodule is solid or liquid mass within the thyroid. These kind of nodules are frequently observed in normal healthy population. This is a common reported finding on ultrasonography. Many Incidental findings of thyroid nodules are reported in about 50% population. The prevalence of most Euthyroid disorder is as: hypothyroidism, nodular goiter, and carcinomas of thyroid is more in menopausal and older age females. Diagnosis of Euthyroid abnormalities in group of these patients is difficult, because these syndromes could be nonspecific or common with postmenopausal and ageing complaints. Many Euthyroid nodules and carcinomas often affect females over the age of 50 years; the diagnostic and therapeutic approach is the same as in the normal people, but the surgical risk and cancer prognosis is worse than in young patients. Euthyroid dysfunction is common in the general population especially in women. However, the prevalence of thyroid diseases increases in menopausal and old aged females.

## CONCLUSION

In postmenopausal women, thyroid diseases are most common than in premenopausal females. At the stage of menopause, the tendency of iodine absorption is low due to the aging effect on gland as a result patient is suffering hyperthyroidism. The postmenopausal women have high incidence of osteoporosis, in these females bone mineral absorption tendency is low so they have high risk of hip or other fracture.

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