

# Hypothyroidism Screening in Menopausal Women

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## ABSTRACT

**Background:** It is probable that almost one in eight women will have some form of thyroid disorder during her lifetime. About 0.3% of the overall American population has overt hypothyroidism, and 4.3% have subclinical hypothyroidism. Subclinical hypothyroidism may be approximately found among 3–8% females, increasing with age; the median age of someone with hypothyroidism is 58 years. The symptoms of thyroid disease can be alike to postmenopausal symptoms and are clinically challenging to discriminate. Currently, there are no proper guidelines about screening of menopausal females for their thyroid function. The purpose of this study was to determine the frequency of hypothyroidism in menopausal women.

**Methods:** A total of 100 patients were included in this study. The patients were stratified earlier age wise and later BMI wise. Through standard procedure TSH, T<sub>3</sub> & T<sub>4</sub> were estimated from the blood. Menopausal status, hypothyroidism, and possible risk factors were assessed and recorded for each patient.

**Results:** We observed 17% of the female patients with hypothyroidism. The hypothyroidism is highly associated with menopausal female age, BMI, TSH, T<sub>3</sub> & T<sub>4</sub>, fatigue, muscle cramp, depression, weight gain, cold intolerance and sleeping problems (p-value < 0.05)

**Conclusion:** Our study had attained significant number of abnormal thyroid function tests which leads to hypothyroidism and cause severe symptoms which is comparable to other reported literature.

**Keywords:** Hypothyroidism, thyroid disorder, thyroid function test, Menopausal status, thyrotropin-releasing hormone

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## INTRODUCTION

Hypothyroidism is defined as elevated thyroid-stimulating hormone (TSH) and decreased serum levels of T<sub>4</sub> and T<sub>3</sub> with or without typical symptoms of hypothyroidism<sup>1</sup>. It is a disorder in which the thyroid gland does not produce sufficient thyroid hormone. Hypothyroidism, or underactive thyroid, is more prevalent in females as compared to males and particularly in people above 50 years of age<sup>2</sup>. Hypothyroidism is a common disorder of endocrine system that occurs due to deficiency of thyroid hormone. Hypothyroidism can also be secondary, but it receives inadequate stimulus as a result of low secretion of thyrotropin (i.e., TSH) from pituitary gland. In tertiary hypothyroidism, insufficient secretion of thyrotropin-releasing hormone (TRH) from the hypothalamus leads to inadequate release of TSH, which in response causes inappropriate thyroid stimulation.<sup>[3]</sup> Hypothyroidism is mostly caused by thyroiditis. Swelling and inflammation destroy the cells of thyroid gland.<sup>[4]</sup> Women are more subject to thyroid disease than men and it is predominantly prevalent in menopausal women<sup>5</sup>.

Central hypothyroidism (CH) is an uncommon cause of hypothyroidism. In general population, it is expected to occur in 1:20,000 to 1:80,000 persons<sup>6</sup>. It is probable that almost one in eight women will have some form of thyroid disorder during her lifetime<sup>7</sup>. About 0.3% of the overall American population has overt hypothyroidism, and 4.3% have subclinical hypothyroidism. Subclinical hypothyroidism may be approximately found among 3–8% females, increasing with age; the median age of someone with hypothyroidism is 58 years<sup>8,9</sup>. There is increasing rate of high levels of TSH with increasing age, principally in postmenopausal females. The occurrence of thyroid disease in population of postmenopausal females can be seen easily in different available literature<sup>10</sup>. The symptoms of thyroid disease can be alike to postmenopausal symptoms and are clinically challenging to discriminate<sup>10</sup>. Currently, there are no proper guidelines about screening of menopausal females for their thyroid function<sup>11</sup>. The occurrence of hypothyroidism, goiters, and thyroid nodules increases with age. Hypothyroidism is most prevalent in elderly populations, with 2-20% of older age groups having some type of hypothyroidism<sup>12</sup>. In National Health and Nutrition Examination Survey (NHANES) 1999-2002, the odds of having hypothyroidism were 5 times greater in persons aged 80 years and older than in individuals aged 12-49

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years<sup>13</sup>. All over the world, iodine deficiency is the most common cause of hypothyroidism<sup>14</sup>. CH may occur due to injury to pituitary glands from physical trauma, compression by a tumor, autoimmune injury, vascular insufficiency, and myriad other causes<sup>14,15,16</sup>. CH is a rare factor that can cause hypothyroidism and usually is a result of thyroid dysgenesis and occur in approximately 1 in 4000 births<sup>14,17</sup>. The third generation TSH assays are readily available and is usually the most sensitive screening for primary hypothyroidism tool. In asymptomatic patients, normal TSH may rule out primary hypothyroidism while abnormal TSH should be followed by assessment of thyroid hormone level<sup>18</sup>. Cut-off levels of TSH i.e., >5mIU/L are conventionally used but a much lower upper limit of TSH was recently proposed<sup>7,18</sup>. This study was carried out to determine the frequency of hypothyroidism in menopausal women and also to determine the possible risk factors like age, BMI, TSH, T3, T4, and association of other sign and symptoms.

## MATERIAL AND METHOD

It was an observational cross sectional study, conducted at the Gynae OPD of Shaikh Zayed & Jinnah Hospitals Lahore. This was a collaborative approach designed and executed by department of Physiology, Federal Post graduate Medical Institute, Shaikh Zayed Hospital Lahore. The study period was six months. A total of 100 patients were enrolled for this study. The exclusion criteria includes the patients with known condition affecting the frequency of hypothyroidism, Females with pathology in uterus or cervix like fibroid uterus, endometrial hyperplasia, Females on Hormonal replacement therapy, History of taking drugs like antiplatelet aspirin, warfarin, heparin and bleeding disorder. Whereas menopausal women with some signs and symptoms of menopause like Hot flushes, depression, weight gain, Sleeping problems, Mood swings and cold intolerance were included in this study. Patient's complete history & demographics were recorded and Blood sample was drawn for T3, T4 and TSH levels. Standard procedures were adopted for various estimates like thyroid hormone, T3, T4 etc.

**Statistical analysis:** All the responses were stored electronically & analyzed later by using SPSS version 20. Descriptive statistics were applied to calculate mean and standard deviation. Frequency and percentage was calculated for qualitative variables like sign and symptoms e.g. fatigue, weight gain, cold intolerance, muscle cramps, sleeping problems,

depression, hypothyroidism and type of hypothyroidism. Over all a P values less than 0.05 was considered statistically significant.

## RESULTS

The study constitutes a total 100 females who presented with menopause with the mean age of  $51.71 \pm 4.95$  years ranging from 45 to 60 years. 49 (49%) females were of age range 45-50 years, 27 (27%) were of age 51-55 years and 24 (24%) were of age range 56-60 years. The mean height of females was  $1.65 \pm 0.07$  meters and range is 1.52-1.77 meters. The mean weight of females was  $71.26 \pm 8.55$  kg with a range of 57-88 kg. The mean BMI of females was  $26.27 \pm 3.84$  with a range of 18.56-35.03.

The study reports 17 (17%) of the patients with hypothyroidism. The mean age at time of menopause with hypothyroidism was  $49.18 \pm 2.96$  years. The mean duration of menopause among hypothyroidism females was  $6.94 \pm 3.91$  years. The mean BMI of females with hypothyroidism was  $29.73 \pm 2.17$  and the mean BMI of females without hypothyroidism was  $25.56 \pm 3.73$ . There was significantly increased BMI of females with hypothyroidism as compared to females without hypothyroidism ( $p$ -value=0.000). Other possible risk factors can be summarized in table 1.

This study also reports a significant relation of age with Hypothyroidism. The chi square test statistics yield their respective significance ( $p$  value <0.05). Among females of age range 45-50 years, 6 (12.2%) had hypothyroidism, 3 (11.1%) in age range 51-55 years and 8 (33.3%) in age range 56-60 years. This study also reports significant difference of hypothyroidism among all three age groups ( $p$ -value=0.050) and frequency was higher among females of age >56 year.

The mean TSH, T3 & T4 of all the females was  $3.34 \pm 2.87$  mIU/L,  $2.03 \pm 0.73$  nmol/L and  $97.15 \pm 31.82$  nmol/L respectively. Among hypothyroidism cases, the mean TSH, T3 and T4 was  $9.18 \pm 1.23$ ,  $3.16 \pm 0.58$  and  $158.2 \pm 20.35$  while among 83 (83%) euthyroid females (no hypothyroidism), the mean TSH was  $2.18 \pm 1.19$ , T3 was  $1.80 \pm 0.75$  and T4 was  $84.65 \pm 17.14$ . The age-wise comparison of all above levels, the mean TSH of females of age 45-50 years was  $2.78 \pm 2.60$  mIU/L,  $3.004 \pm 2.53$  mIU/L for age range 51-55 years, and  $4.86 \pm 3.31$  mIU/L for age range 56-60 years. We observed a significant difference among all three age groups ( $p$ -value = 0.010) and females in age range 56-60 years had more chances of developing hypothyroidism.

Table 1: Possible risk factors for Hypothyroidism (\*significant at 95% alpha)

Possible Risk factors	Frequency	Hypothyroidism (present)	Hypothyroidism (Absent)	P-value
		Mean±SD	Mean±SD	
Fatigue	85 (85%)	10 (58.8%)	75 (80.4%)	0.001*
Muscle cramps	61 (61%)	5 (29.4%)	56 (67.5%)	0.003*
Depression	46 (46%)	17 (100%)	29 (34.9%)	0.000*
Weight gain	23 (23%)	14 (82.4%)	9 (10.8%)	0.000*
Cold intolerance	22 (22%)	15 (88.2%)	7 (8.4%)	0.000*
Sleeping problems	4 (4%)	0 (0%)	4 (4.8%)	0.356*

## DISCUSSION

In routine, it was observed that females at menopausal age group present with severe sign and symptoms of menopause. But most of them have other hormonal or endocrine problems which cause these symptoms or increase severity or symptoms. The symptoms of thyroid disease can be similar to postmenopausal complaints and are clinically difficult to differentiate. There can also be an absence of clinical symptoms. It is of importance that even mild thyroid failure can have a number of clinical effects such as depression, memory loss, cognitive impairment and a variety of neuromuscular complaints<sup>10</sup>.

This is because the thyroid can affect many hormonal systems in the body which in turn affect the thyroid. Menopause is caused by changing levels of hormones like estrogen and progesterone. Estrogen is a hormone that enhances thyroid function. If estrogen levels are low, thyroid functioning also goes down. This is one the main reasons why so many women in menopause and peri-menopause end up with thyroid condition. <sup>[19]</sup>Our study reports similar outcomes. Moreover a study conducted by Hollowell et al. reported somewhat high frequency of hypothyroidism in females presented at menopausal age, as compared to ours i.e. 26% among all premenopausal and menopausal women presented in their study<sup>8</sup>. The frequency of hypothyroidism is higher than reported earlier except the above stated study. This may be due to the nutritional status of females is poor in our population and lack of strategy of routine check-up among females. During hypothyroidism, thyroid function / hormonal level were not considered and remained ignored which later on, cause hypothyroidism or lack of nutrients in the body. In India, Joshi et al. reported that the prevalence of hypothyroidism is somewhat low in peri and post-menopausal age group as found in our study i.e., 12.5%. The authors concluded that prevalence of hypothyroidism is high in this age groups and screening should be done in this age group to prevent complications of hypothyroidism<sup>11</sup>. Internationally, various research studies reported the prevalence of spontaneous hypothyroidism between 1-2% among peri or postmenopausal women and are

more common in older females<sup>20</sup>. We observe in our study that among all positive hypothyroidism cases, majority had clinical hypothyroidism while fewer with subclinical hypothyroidism. This contradicts with the available reported literature, that Subclinical hypothyroidism or mild thyroid failure is a common problem, with a prevalence of 3% to 8% in the population without known thyroid disease<sup>8,21</sup>. The incidence of thyroid disease in a population of postmenopausal women is as follows: clinical thyroid disease, about 2.4%; subclinical thyroid disease, about 23.2%. Among the group with subclinical thyroid disease, 73.8% are hypothyroid and 26.2% are hyperthyroid<sup>11</sup>.

In our study, we stratified females age wise and observed that the mean TSH of females of age 45-50 years was significantly lower than females of age range 51-55 years and females of age range 56-60 years (p-value=0.010). Thus we may be able to predict the females in age range 56-60 years had more chances of developing hypothyroidism. Thyroid dysfunction is common, especially among women over the age of 50. In caring for peri- and post-menopausal women, it is important to recognize the changing clinical manifestations of thyroid disease with age<sup>22</sup>. This has been proved with our study findings. The females of age ≤50 years, the rate of hypothyroidism was significantly low as compared to females of age >55 years, out of which hypothyroidism was more common in females of age >55 i.e., 33.3% (p-value = 0.050). We statistically stratified the BMI Status for all patients and observed a statistically significant association with hyperthyroidism (p value <0.05). Our study also reports that females with hypothyroidism had more weight gain as compared to females without hypothyroidism.

## CONCLUSION

Our study had attained significant number of abnormal thyroid function tests which leads to hypothyroidism and cause severe symptoms which is comparable to other reported literature. We also report local magnitude for hypothyroidism among menopausal females. Although the frequency of hypothyroidism is low among females of this age

group but risk may be high in females of age more than 56 years.

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