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Original Article

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Thyroid Dysfunction in Postmenopausal Women Attending General Health Check-Up at a Tertiary Care Center in Kathmandu: A Cross-Sectional Study

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Abstract

Introduction: *Thyroid disorders are increasingly prevalent, with a higher incidence in women, particularly postmenopausal women. Symptoms of menopause, such as irritability, hot flushes, fatigue, and weight gain, often overlap with those of thyroid dysfunction, complicating diagnosis. Identifying thyroid dysfunction in this population is crucial for improving their overall health and preventing complications like cardiovascular diseases, which are associated with untreated thyroid disorders.*

Methodology: *A hospital-based, retrospective, cross-sectional study was conducted involving 170 postmenopausal women attending a general health check-up at a tertiary care center in Kathmandu. Ethical approval was obtained from the IRC, and data were collected on thyroid function, including the incidence of subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism, and overt hyperthyroidism. Data were analyzed using SPSS, with descriptive and inferential statistics used to assess the prevalence of thyroid dysfunction and its potential impact on cardiovascular risk and overall health.*

Results: *The average age of participants was 60.59 years. Among the study population, clinical thyroid disorders were observed in 3.53% of participants, with clinical hyperthyroidism at 1.18% and clinical hypothyroidism at 2.35%. Subclinical thyroid disorders were more prevalent, with subclinical hypothyroidism affecting 11.76% and subclinical hyperthyroidism 4.12% of the participants.*

Conclusion: *The study highlights the importance of screening for thyroid disorders in postmenopausal women, as 3.53% of participants had clinical thyroid conditions and 15.88% had subclinical disorders. Early detection and treatment of these conditions are crucial for improving patient outcomes and preventing related health complications.*

Keywords: Thyroid disorders, Postmenopausal females

1. Introduction

Thyroid disorders are increasingly prevalent worldwide, second only to diabetes mellitus [1]. They are 5 to 20 times more common in females, especially as age increases. Postmenopausal women are particularly prone to autoimmune thyroid diseases and nodular goiters, with symptoms often mimicking menopausal changes such as anxiety, sweating, and weight gain [2,3]. Subclinical hypothyroidism is the most frequent thyroid disorder, affecting women 7 to 10 times more than men [3,4]. The Wickham study reported elevated TSH in 7.6% of women, rising to 17% in those over 70 [3,4]. Symptoms include weight gain, fatigue, and increased cardiovascular risk, especially in patients under 65 years or with TSH levels >10 mIU/L [5-8]. Progression to overt hypothyroidism occurs at 2.6% per year, doubling in those with positive TPO antibodies or TSH ≥10 mIU/L [9]. Treatment is recommended for overt hypothyroidism, while subclinical cases are managed based on age, symptoms, and cardiovascular risk [8]. Hyperthyroidism affects 2% of the general population and is more common in women [3,4]. The incidence varies with iodine intake, with Graves' disease predominating in iodine-sufficient areas and toxic nodular goitre in iodine-deficient regions [10]. Symptoms of hyperthyroidism, such as palpitations and insomnia, are often confused with menopause, though weight loss and arrhythmias are more indicative of thyroid dysfunction [11]. Overt hyperthyroidism is linked to an increased risk of ischemic heart disease, atrial fibrillation, and mortality [8]. Subclinical hyperthyroidism (SH) presents risks similar to an overt disease, particularly in those with TSH <0.1 mIU/L [11]. Treatment of SH is advised for postmenopausal women at risk of osteoporosis or cardiovascular disease, with beta-blockers used to manage symptoms [12].

Despite a well-established understanding of thyroid disorders,

particularly in women, there remains a significant gap in our knowledge regarding the prevalence and management of these conditions in postmenopausal women in Nepal [13]. The overlap of thyroid dysfunction symptoms with menopausal symptoms, such as fatigue, weight changes, and mood disturbances, often complicates accurate diagnosis [14]. Additionally, most research on thyroid disorders has been conducted in developed countries, where access to healthcare, diet, and environmental factors differ from those in Nepal. The lack of population-specific data from low-resource settings underscores the need for a focused investigation on thyroid dysfunction in postmenopausal women in Nepal [14,15].

This study aims to assess the burden of thyroid disorders, including subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism, and overt hyperthyroidism, among postmenopausal women attending a general health check-up at a tertiary care center in Kathmandu. The findings of this study will help inform healthcare providers for early diagnosis and treatment of thyroid dysfunction in postmenopausal women, ultimately improving their quality of life.

2. Method

This cross-sectional quantitative study employed a retrospective data collection approach to analyze the association between thyroid disorders and postmenopausal females. Conducted at Tribhuvan University Teaching Hospital (TUTH), Maharajgunj, one of Nepal's largest healthcare centers, the study population consisted of postmenopausal women attending the General Health Checkup Clinic. The hospital's diverse patient pool provided a representative sample, allowing for meaningful analysis of thyroid disorders in this group. Convenience sampling was used to select participants, and the sample size was calculated using the Cochrane formula ($N = Z^2PQ/e^2$), resulting in a required sample size of 170 participants ($Z = 1.96$, $P = 0.5$, $e = 0.075$). Inclusion criteria required postmenopausal females without a prior diagnosis of thyroid disorders, while those with diagnosed thyroid conditions were excluded. Data were collected using a structured questionnaire to gather socio-demographic details, clinical parameters, and thyroid function tests (TFTs), including FT3, FT4, and TSH, which were conducted in TUTH's biochemistry lab. Additionally, comorbidities such as diabetes and hypertension were recorded to explore their association with thyroid dysfunction. The data were analyzed using descriptive statistics, with percentages and frequencies used to report demographic characteristics and the prevalence of thyroid disorders. The statistical analysis aimed to identify relationships between clinical and demographic factors and thyroid disorders among the study population. Ethical approval for the study was granted by the Tribhuvan University Institute of Medicine Ethical Review Board with references no. 67E2 [6-12]. Informed consent was obtained from all participants, who were assured of the confidentiality and anonymity of their personal information. The study adhered to all ethical guidelines, ensuring participants' rights and privacy were respected throughout the research process. The study's findings provided valuable insights into the prevalence and clinical factors associated with thyroid disorders in postmenopausal women in Nepal.

3. Results

A total of 170 post-menopausal women were enrolled in the study, with a mean age of 60.59 ± 8.94 years. The age distribution showed that 40% (n=69) of participants were in the 50-59 age group, while 29% (n=49) were in the 70-79 age group. Only 2.9% (n=5) were aged 80 years and above (Table 1). The mean BMI of participants was 26.76 ± 4.61, with 4.1% classified as underweight, 18.2% as normal weight, 33.5% as overweight, and 44.1% as obese (Table 2). This high prevalence of overweight and obesity underscores a significant concern for metabolic health in this population.

Thyroid function was assessed through FT3, FT4, and TSH levels. The mean FT3 was 4.17 ± 0.83 pmol/L, FT4 was 12.22 ± 1.95 pmol/L, and TSH was 2.69 ± 2.72 µIU/mL. Comorbidities included 29.4% with hypertension, 13.5% with diabetes, 15.3% with hypothyroidism, and 4.1% with other comorbidities (Table 3). Table 4 reveals that hyperthyroid individuals had significantly higher FT3 and FT4 levels, and lower TSH levels compared to those with normal thyroid function. Creatinine levels were also significantly lower in the hyperthyroid group. No significant differences were found in age, BMI, FBS, urea, total cholesterol, HDL-C, LDL-C, triglycerides, or uric acid between these groups. In contrast, Table 5 demonstrates that hypothyroid participants had significantly lower FT3 and FT4 levels, and markedly higher TSH levels compared to the normal group. There were no significant differences in age, BMI, FBS, urea, creatinine, total cholesterol, HDL-C, LDL-C, triglycerides, or uric acid levels between the hypothyroid and normal groups. Table 6 highlights that BMI was significantly lower in the hypothyroid group. Thyroid hormone levels (FT3, FT4, and TSH) varied significantly between thyroid status groups, with the highest FT3 and FT4 levels in the hyperthyroid group and the lowest TSH levels. Hypothyroid individuals had elevated creatinine levels compared to others. Despite these differences, FBS, urea, total cholesterol, HDL-C, LDL-C, triglycerides, and uric acid levels did not differ significantly between thyroid status groups.

Table 8 provides insights into thyroid status across different age groups. Most women across all age groups had normal FT3 and FT4 levels. Hypothyroidism, indicated by low FT4, was rare and evenly distributed, affecting only four women. TSH levels showed that most women (143) had normal thyroid function, while seven exhibited hypothyroidism, with a slight concentration in the 50-59 age group. Hyperthyroidism, affecting 20 women, was more prevalent in the 60-79 age group. This suggests that thyroid dysfunction, particularly hyperthyroidism, is more common in older women, while younger women (<50) predominantly show normal thyroid function.

Table 9 reveals that thyroid status varied with BMI. Most women had normal FT3 and FT4 levels, with thyroid dysfunction, particularly hyperthyroidism and hypothyroidism, being more prevalent among overweight and obese women. The data show that hyperthyroidism and hypothyroidism were more common in

the obese category, highlighting a potential association between thyroid dysfunction and higher BMI. Overall, these findings indicate that thyroid disorders are more frequent in older and obese women, emphasizing the need for targeted screening and management strategies in these populations.

Age Group (in years) 60.59 ± 8.94	**Frequency**	**Percentage**
<50	18	10.6
50–59	69	40.6
60–69	49	28.8
70–79	29	17.1
≥ 80	5	2.9
BMI Classification (kg/m^2) 26.76 ± 4.61		
Underweight	7	4.1
Normal	31	18.2
Overweight	53	31.2
Obese	79	46.5

Table 1: Distribution of participants by Age group and Body Mass Index

Variable	**Mean**	**S D**
FT3 (pmol/L)	4.17	0.83
FT4 (pmol/L)	12.22	1.95
TSH (µIU/mL)	2.69	2.72
FBS (mmol/L)	5.16	3.33
UREA (mmol/L)	3.98	1.48
CREATININE (µmol/L)	56.37	11.36
TC	5.02	0.96
HDL-C (mmol/L)	1.13	0.26
LDL-C (mmol/L)	3.30	0.88
TAG (mmol/L)	1.76	0.94
URIC ACID (mg/dl)	315.24	82.14

Table 2: Mean and standard Deviation of the demographic and clinical parameters (n=170)

Co-morbidities	**Frequency**	**Percentage**
Hypertension	50	29.4
Diabetes	23	13.5
Hypothyroid	26	15.3
Others	7	4.1

Table 3: Co-morbidities of participants (Multiple responses)

Variables	Normal(168)		Hyperthyroid(2)		p-value
	Mean	SD	Mean	SD	
Age	60.53	8.82	66	21.21	0.789
BMI	26.80	4.61	23.35	3.60	0.222
FT3	4.10	0.50	9.995	2.89	0.015*
FT4	12.15	1.87	17.555	1.80	0.021*
TSH	2.72	2.72	0.0835	0.09	0.018*
FBS	5.16	3.35	4.75	0.35	0.597
UREA	3.97	1.47	5.35	2.19	0.230
CREATININE	56.50	11.36	45.5	0.70	0.039*
TC	5.03	0.96	4.25	0.77	0.233
HDL-C	1.13	0.26	1.25	0.35	0.536
LDL-C	3.31	0.88	2.65	0.77	0.272
TAG	1.77	0.94	1.1	0.56	0.281
URIC ACID	316.05	82.29	247.00	4.24	0.112

*statistically significant i.e p <0.05

Table 4: Distribution of parameters by thyroid status and FT3

Variables	Hypothyroid (4)		Normal(166)		p-value
	Mean	SD	Mean	SD	
Age	61.75	7.932	60.57	8.986	0.662
BMI	24.2275	7.55485	26.8216	4.53573	0.662
FT3	3.1925	.20662	4.1989	.83368	0.001*
FT4	8.3025	.50980	12.3177	1.87856	0.001*
TSH	12.6900	7.36339	2.4549	2.03983	0.002*
FBS	4.2750	.62915	5.1831	3.37351	0.294
UREA	3.5500	.42032	3.9982	1.50222	0.629
CREATININE	60.5000	8.26640	56.2771	11.42598	0.221
TC	5.3500	.88882	5.0175	.96452	0.434
HDL-C	1.2250	.36856	1.1337	.26136	0.558
LDL-C	3.7250	1.07199	3.2964	.88276	0.443
TAG	2.2750	1.58403	1.7560	.92909	0.484
URIC ACID	304.2500	65.89069	315.5120	82.64548	0.809

*statistically significant i.e p <0.05

Table 5: Distribution of parameters by thyroid status and FT4

Variables	Hyperthyroid (7)		Normal (143)		Hypothyroid (20)		p-value
	Mean	SD	Mean	SD	Mean	SD	
Age	59.29	10.19	60.41	8.68	62.35	10.55	0.400
BMI	25.09	4.55	27.22	4.44	24.05	4.97	0.024*
FT3	6.28	2.85	4.11	0.47	3.88	0.51	0.002*
FT4	15.88	2.66	12.26	1.70	10.66	1.60	0.001*
TSH	0.07	0.08	2.01	1.15	8.46	3.91	0.001*
FBS	4.80	0.23	4.97	1.74	6.59	8.58	0.363
UREA	4.17	1.36	3.95	1.50	4.16	1.44	0.747

CREATININE	48.57	2.29	55.98	10.89	61.90	14.29	0.005*
TC	4.30	0.54	5.04	0.95	5.14	1.04	0.060
HDL-C	1.14	0.32	1.12	0.25	1.20	0.27	0.349
LDL-C	2.57	0.74	3.33	0.89	3.37	0.76	0.063
TAG	1.44	0.78	1.75	0.91	2.01	1.19	0.474
URIC ACID	266.71	69.72	318.02	78.33	312.40	108.12	0.225

*statistically significant i.e p <0.05

Table 6: Distribution of parameters by thyroid status and TSH

Parameters	**FT3**	**FT4**	**TSH**
FT3	1	.	
FT4	0.391**	1	
TSH	-0.231**	-0.401**	1

**. Correlation is significant at the 0.01 level.

Table 7: Correlation between variables

Parameters		**Age Group (in years)**					**Total**
		< 50	**50 - 59**	**60 - 69**	**70 -79**	**≥80**	
FT3	Normal	18	68	49	29	4	168
	Hyperthyroid	0	1	0	0	1	2
FT4	Hypothyroid	0	2	1	1	0	4
	Normal	18	67	48	28	5	166
TSH	Hypothyroid	0	4	2	0	1	7
	Normal	14	62	41	22	4	143
	Hyperthyroid	4	3	6	7	0	20
Total		18	69	49	29	5	170

Table 8: Age group-wise thyroid status of post-menopausal women

Parameters		BMI				Total
		Underweight	Normal	Overweight	Obese	
FT3	Normal	7	30	52	79	168
	Hyperthyroid	0	1	1	0	2
FT4	Hypothyroid	1	0	1	2	4
	Normal	6	31	52	77	166
TSH	Hypothyroid	0	3	1	3	7
	Normal	4	23	46	70	143
	Hyperthyroid	3	5	6	6	20
Total		7	31	53	79	170

Table 9: Body Mass Index wise thyroid status of post-menopausal women

4. Discussion

Our study showed that hyperthyroidism is more prevalent in the elderly population. It also revealed a higher incidence of thyroid dysfunction in individuals with elevated BMI. Subclinical hypothyroidism was more common among postmenopausal women, consistent with findings from other studies like Shrestha et al. Crafa et al. [16,17].We observed a higher proportion of subclinical hypothyroidism, with 15.33 % of subclinical hypothyroidism (SCHO) already diagnosed as subclinical hypothyroidism. Thus this study reveals a high prevalence of thyroid dysfunction among post-menopausal women, with 3.53% having clinical thyroid disorders and 15.88% exhibiting subclinical

thyroid disorders. Risk of osteoporosis, cerebrovascular events, cardiovascular disease increases in postmenopausal women and it could also be associated with thyroid dysfunction. SCHO is associated with impaired left ventricular diastolic function at rest, systolic dysfunction during exertion, and an increased risk of atherosclerosis and myocardial infarction. However, these effects may be reversible with thyroxine replacement therapy [18]. Thus, The findings of our study highlight the frequent occurrence of subclinical hypothyroidism and suggest that thyroid disorders are more common in older age groups and those with higher BMI.

Thyroid dysfunction is a common endocrine disorder in Nepal, especially among women and postmenopausal individuals. Studies from tertiary care centres in Kathmandu show prevalence rates between 29% and 36% [19,20]. 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 of the main reasons why so many women in menopause and peri-menopause end up with thyroid conditions [21]. Experiments highlight the role of estrogen in the development of thyroid dysfunction. One of the most widely accepted mechanisms involves thyroid dysfunction in postmenopausal women. Estrogen binds to thyroglobulin, restricting the entry of thyroxine into cells, which leads to an increase in bound thyroxine and a decrease in free thyroid hormone levels [22]. It is important that even mild thyroid failure can have several clinical effects such as depression, memory loss, cognitive impairment and a variety of neuromuscular complaints [22]. As it is evident all postmenopausal also experience similar symptoms so if thyroid disorders are diagnosed and treated early, it will improve the quality of life of postmenopausal females.

Previous studies have shown that obesity has complex effects on the endocrine system, although this is rarely highlighted. Obesity can impact thyroid function, disrupt the release of gonadotropin-releasing hormone (GnRH), alter luteinising hormone pulse amplitude, reduce growth hormone levels, and increase cortisol levels. There is a strong link between thyroid function and obesity, as well as obesity-related metabolic diseases. As a result, there is growing interest in understanding how obesity affects thyroid function [23]. In our study, there was a consistent increase in thyroid disorder with an increase in BMI showing 46.5% (79) participants in the obese category with a thyroid disorder.

Our study result is consistent with the above-cited prevalence of thyroid disorders in postmenopausal females. Thus, Regular thyroid screening is essential for this demographic to manage and mitigate associated health risks effectively. While the study's single-centre and small sample size limit generalizability, these results underscore the need for broader research to better understand and address thyroid health in post-menopausal women. However, the result can be generalized as screening does no harm rather if timely diagnosed and treated improves the quality of life of postmenopausal females.

5. Conclusion

This study reveals a high prevalence of thyroid dysfunction among post-menopausal women, with 3.53% having clinical thyroid disorders and 15.88% exhibiting subclinical thyroid disorders. The findings highlight the frequent occurrence of subclinical hypothyroidism and suggest that thyroid disorders are more common in older age groups and those with higher BMI. Regular thyroid screening is essential for this demographic to effectively manage and mitigate associated health risks. While the study's single-center and small sample size limit generalizability, these results underscore the need for broader research to better understand and address thyroid health in post-menopausal women.

Author Contributions

YLS,SG,DCA,RS reviewed the literature, conceptualized and designed the research; RS,DCA,YLS did data collection, analysis and prepare result,YLS,DCA,MY,NAS drafted the manuscript; and all authors reviewed the manuscript and approved the final version of the manuscript. All authors agreed to be accountable for all aspects of the research work.

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Ethical Approval

This research was approved by IRC of Institute of Medicine,Tribhuvan University with the reference number 67(6-11)E2

Consent/Assent

Informed written consent was obtained from the all the participants before data collection.

Data Availability Statement

The data that support the findings of this study are available within the article and/or its supplementary materials.

Conflicts of Interest

There is no financial or non-financial conflict of interest any of the authors.

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