International Journal of Advances in Medicine
Shetty AGN et al. Int J Adv Med. 2021 Aug;8(8):1069-1072
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: https://dx.doi.org/10.18203/2349-3933.ijam20212802

Original Research Article

Study of thyroid profile in pre and post-menopausal women: a case control study

Aravind Gutlur Nagarajaiah Shetty, Suma Lingaraju*, Manohara Melur Chandregowda

Department of General Medicine, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India

Received: 21 June 2021
Accepted: 05 July 2021

***Correspondence:**
Dr. Suma Lingaraju,
E-mail: sumajairajl@gmail.com

ABSTRACT

Background: The prevalence and incidence of thyroid disorders is influenced primarily by sex and age are more common in women and in older adults. Thyroid disorders if left untreated will increase risk of cardiovascular diseases and osteoporosis. Hence, screening for thyroid dysfunction must be done as routine investigation in the women presenting with menopausal symptoms.
Methods: This case control study includes 50 pre-menopausal women of age group 34-49 years and 50 post-menopausal women of age group 50-55 years, visiting General medicine department of Victoria hospital and hospital affiliated to Bangalore Medical College and Research Institute. All the subjects were subjected for serum triiodothyronine (T_3), tetraiodothyronine or thyroxine (T_4), thyroid stimulating hormone (TSH), free T_3 and T_4 levels.
Results: Out of all subjects; 23 were hyperthyroid out of which 14 were post-menopausal women, 37 were hypothyroid out of which 19 were post-menopausal women. Chi-square test showed no significant association. Negative and weak correlation was seen between total T_3 and age; total T_4 and age; TSH and age; free T3 and age; free T_4 and age in pre-menopausal women. Negative and moderate correlation was seen between total T3 and age; total T4 and age; free T_3 and age. There was a positive and weak correlation seen between TSH and age; weak positive non-significant correlation seen between free T_4 and age. Significant correlation was seen between total T_3 and age in post-menopausal women.
Conclusions: Post-menopausal women should be monitored for serum T3, T4, TSH levels for reducing risk of thyroid dysfunction.

Keywords: Thyroid, Thyroid stimulating hormone, Post-menopausal women

INTRODUCTION

A delicate balance of bodily hormones balances the human life such as oestrogen, progesterone, testosterone and many others. A number of anatomical and physiological changes controlled by female sex hormone are involved in women. Reproductive system and overall body metabolism are influenced by thyroid hormones.[1]

Thyroid diseases mainly affect women. The incidence of thyroid diseases is five to 20 times higher in women than men. The literature has shown an increasing trend of thyroid disease with increase in age. Occurrence of thyroid gland autoimmunity, hypothyroidism, nodular goitre and cancer occur most often in post-menopausal and elderly women than younger women.[2]

Thyroid functions are often influenced by the nutritional status, associated co morbidities, co factors such as body surface area and others.[3,4] Women in their 40s and 50s often suffer from symptoms including fatigue, moodiness, erratic periods, sleep problems, loss of sex drive and weight gain. But most of symptoms goes unnoticed.

Erratic medications including hormone replacement therapy (HRT), anti-depressants or sleeping are often

prescribed which undermines the actual problem. The literature available has documented immensely about correlation of thyroid status with menstrual irregularities. But the literature comparing the thyroid status in pre and post-menopausal women is scant which made to take up this study.

METHODS

A case control study was conducted in department of general medicine of Victoria hospital and hospital affiliated to Bangalore Medical College and Research Institute. About 50 post-menopausal women of age group 50-55 years satisfying inclusion and exclusion criteria constituted the cases and 50 pre-menopausal women of age group 34-49 years were chosen as controls.

For purpose of the study, any female who had no menstruation for a minimum of 1 year duration were considered as post-menopausal women. Known cases of thyroid disorders, hypertension, diabetes mellitus, obesity and systemic diseases were excluded from the study. The sample selected was subjected for thorough clinical examination including basic and special laboratory investigations.

The data thus collected was entered in a predesigned proforma and statistics was carried out using suitable parametric and nonparametric tests of significance and comparison of serum triiodothyronine (T_3), tetraiodothyronine or thyroxine (T_4), thyroid stimulating hormone (TSH), free T_3, and T_4 between two groups by using Chi-square test.

RESULTS

This study had shown that, the mean age of pre-menopausal subjects was 40.66±4.246 and post-menopausal subjects was 53.20±1.26.

Upon comparison of total T_3, T_4 and TSH between the groups in this study, total T_3 (161.82±114.39 ng/dl); total T_4 (9.10±6.33 µg/dl) and TSH (20.16±29.54 IU) was higher in post-menopausal women. There was no statistically significant difference seen between the groups (pre-menopausal and post-menopausal women).

Table 3 shows the comparison of free T_3, T_4 between the groups. Free T_3 (318.10±156.34 ng/dl); free T_4 (1.32±1.38 µg/dl) was higher in post-menopausal women. T test shown that, there was no statistically significant difference between the groups (pre-menopausal and post-menopausal women).

Negative and weak correlation was seen between total T_3 and age (r=-0.11, p=0.44); total T_4 and age (r=-0.252, p=0.077); TSH and age (r=-0.253, p=0.079); free T_3 and age (r=-0.12, p=0.37); free T_4 and age (p=-0.21, p=0.13) in pre-menopausal women. Negative and moderate correlation was seen between total T_3 and age (r=-0.31, p=0.028); total T_4 and age (r=-0.21, p=0.13); free T_3 and age (r=-0.41, p=0.31).

There was a positive and weak correlation seen between TSH and age (r=0.23, p=0.10); weak positive non-significant correlation seen between free T_4 and age (r=0.07, p=0.62). Significant correlation was seen between total T_3 and age (r=-0.31, p=0.028) in post-menopausal women.

Out of 100 subjects; 23% were hyperthyroid, of which 28% were post-menopausal women. About 37% of them were hypothyroid, of which 38% were post-menopausal women. Normal thyroid levels were for 40% of the subjects, of majority of them were pre-menopausal women. Chi-square test was applied to check the association between thyroid profile and menopausal condition. Chi-square test showed no significant association (χ^2=2.01; p=0.36, NS).

Table 1: Mean age distribution of the subjects.

Pre/post-menopausal	N	Minimum	Maximum	Mean	Standard deviation
Pre-menopausal	50	34	49	40.66	4.246
Post-menopausal	50	51	55	53.20	1.262

Table 2: Comparison of the groups (pre-menopausal and post-menopausal women).

Total T3 and T4	Pre/post-menopausal	Minimum	Maximum	Mean	SD	Mean difference	P value
Total T3	Pre-menopausal	43	369	141.94	94.862	-19.88	0.34
	Post-menopausal	23	450	161.82	114.394		
Total T4	Pre-menopausal	3	22	8.22	4.122	-0.88	0.41
	Post-menopausal	2	28	9.10	6.335		
TSH	Pre-menopausal	0	100	12.90	21.359	-7.2	0.16
	Post-menopausal	0	100	20.16	29.549		

Table 3: Comparison of the groups (pre-menopausal and post-menopausal women).

Free T3 and T4	Pre/post-menopausal	Minimum	Maximum	Mean	SD	Mean difference	P value
Free T3	Pre-menopausal	78	580	291.44	136.297	-26.6	0.36
	Post-menopausal	65	650	318.10	156.341		
Free T4	Pre-menopausal	0.0	5.6	1.251	1.2383	-0.07	0.77
	Post-menopausal	0.1	6.3	1.325	1.3806		

Table 4: Pearson's correlation between age and thyroid parameters.

Parameter	Pre-menopausal		Post-menopausal	
	Age		Age	
	R value	P value	R value	P value
Total T3	-0.11	0.44	-0.31	0.028*
Total T4	-0.252	0.077	-0.21	0.13
TSH	-0.253	0.079	0.23	0.10
Free T3	-0.12	0.37	-0.14	0.31
Free T4	-0.21	0.13	0.07	0.62

*significant

Table 5: Distribution of the subjects based on thyroid profile.

Thyroid profile	Groups		Total
	Pre-menopausal N (%)	Post-menopausal N (%)	
Hyperthyroid	9 (18.0)	14 (28.0)	23 (23.0)
Hypothyroid	18 (36.0)	19 (38.0)	37 (37.0)
Normal	23 (46.0)	17 (34.0)	40 (40.0)
Total	50 (100)	50 (100)	100 (100)
Chi-square value	2.01		
P value	0.36		

DISCUSSION

This study was mainly undertaken to compare the thyroid profile between pre and post-menopausal women.

The mean age of pre-menopausal subjects was 40.66 years and post-menopausal subject was 53.20 years. A number of thyroid causes were proposed for increased TSH activities in the elderly, including nutritional iodine supply, sleep disturbances, altered sleep patterns and others.[6] Pituitary thyroid axis undergoes change with age which results in serum TSH activities with increasing age.[7]

The comparison of mean hormone levels between the pre and post-menopausal women had shown that, total T_3, T_4 and TSH was higher in post-menopausal women which was not statistically significant. Free T_3 level was 318.10 ng/dl and free T_4 level (1.32 µg/dl) was higher in post-menopausal women than the pre-menopausal women which was not statistically significant. A study by Bordoloi et al had shown that, the post-menopausal women had significantly higher TSH levels than pre-menopausal women.[8] A study by Kolanu et al had reported that, the mean TSH and T_4 were higher and T_3 was lower in post-menopausal women than the pre-menopausal women.[1] Patwa et al also observed similar results.[9]

This study had shown negative and weak correlation in total T3 and age; total T4 and age; TSH and age; free T3 and age; free T4 and age in pre-menopausal women. Negative and moderate correlation was seen between total T3 and age; total T4 and age; free T3 and age in pre-menopausal women. There was a positive and weak correlation seen between TSH and age; weak positive non-significant correlation seen between free T4 and age (r=0.07, p=0.62). Significant correlation was seen between total T3 and age in post-menopausal women. In a study by Bordoloi et al, the correlation was not significant in both the groups.[8]

Comparison of thyroid status had shown higher hypo and hyperthyroid cases in post-menopausal women when compared to pre-menopausal women which was statistically not significant. Garg et al observed that, about 21% of the post-menopausal women had subclinical hypothyroidism.[10] Another study by Joshi et al has shown a prevalence of hypothyroidism was 12.5% in peri and post-menopausal women, 1.5% had overt hypothyroidism and 11% cases had subclinical hypothyroidism.[11]

Limitations

The study had limitations of assessing the thyroid levels in particular age group only, convenience sampling was used and the study deign.

CONCLUSION

This had noted the disturbances in the thyroid profile in post-menopausal women. Hence, they should be monitored at regular intervals in order to reduce thyroid dysfunction.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kolanu BR, Vedakedath S, Boddula V, Kandi V. Evaluation of the activities of thyroid hormones among pre and Euthyroid Women: A cross sectional study from a Tertiary care teaching hospital in India: Cureus. 2019;11(3):e4259.
2. Garber JR, Cobin RH, Gharib H. Clinical practice guidelines for hypothyroidism in adults: cosponsored by Americam Association of Clinical Endocrinologists and the American Thyroid Association. Thyroid. 2012;22:1200-35.
3. Holthausen FF, von Müller F, Happel C, Kranert WT, Grünwald F. Age and body composition influence TSH concentrations after administration of rhTSH. Nuklearmedizin. 2015;54(1):20-5.
4. Guastamacchia E, Giagulli VA, Licchelli B, Triggiani V. Selenium and Iodine in Autoimmune Thyroiditis. Endocr Metab Immune Disord Drug Targets. 2015;15(4):288-92.
5. Kapadia NA, Mehta N. Comparison of thyroid profile in pre menopausal and post-menopausal women. Int J Basic Physiol. 2017;6(1):150-4.
6. Sarne D. Effects of the Environment, Chemicals and Drugs on Thyroid Function. In: Feingold KR, Anawalt B, Boyce A, editors. South Dartmouth (MA): MDText.com, Inc. 2000.
7. Benhadi N, Fliers E, Visser TJ, Reitsma JB, Wiersinga WM. Pilot study on the assessment of the setpoint of the hypothalamus-pituitary-thyroid axis in healthy volunteers. Eur J Endocrinol. 2010;162:323-9.
8. Bordoloi G, Jahan W. A study of thyroid function in pre-menopausal and post-menopausal women of Dibrugarh town, Assam, India. Int J Res Med Sci. 2018;6:3015-9.
9. Patwa CK, Khan ST, Sete A, Afroz SA. Study of serum TSH level in Pre-menopausal Women and Post-menopausal women. IOSR J Dent Med Sci. 2016;15(4):1-3.
10. Garg N, Sodhi K, Singh J, Badyal A. Evaluation of subclinical hypothyroidism in women of post-menopausal age group. J Adv Res Biol Sci. 2014;4(1):20-2.
11. Joshi S, Bhalerao A, Somalwar S, Jain S, Vaidya M, Sherawat N. Screening of Peri-and Post-menopausal Women for Hypothyroidism. J South Asian Fede Obst Gynecol. 2011;3(1):14-6.

Cite this article as: Shetty AGN, Lingaraju S, Chandregowda MM. Study of thyroid profile in pre and post-menopausal women: a case control study. Int J Adv Med 2021;8:1069-72.