EVALUATION OF AMBULATORY ARTERIAL STIFFNESS INDEX IN HYPERTHYROIDISM

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BACKGROUND

Hyperthyroidism, whether endogenous or exogenous in origin, causes hemodynamic changes that are associated with adverse cardiovascular outcomesAmbulatory arterial stiffness index (AASI) is a non-invasive way of measuring arterial stiffness and defined as 1 minus the regression slope of diastolic on systolic BP values derived from a 24-hour ambulatory blood pressure monitoring (ABPM) recordings. Several studies showed an association betweeen overt and subclinical hyperthyroidism and increased arterial stiffness, as well as impaired vascular elasticity. However, there is no data about AASI and its relationship with thyroid hormones. In this study, we aimed to investigate AASI and the BP variability as the indicators of cardiovascular risk in overt and subclinical hyperthyroidism as well as healthy control subjects.

METHODS

We enrolled 59 patients with hyperthyroidism and 25 healthy euthyroid controls in the study. The hyperthyroid group included 36 patients with subclinical hyperthyroidism and 23 patients with overt hyperthyroidism. Patients with both endogenous and exogenous subclinical hyperthyroidism were included in the study. ABPM recording was performed for 24-hours using Spacelabs model 90207 monitors (Issaquah, WA, USA), on a day of standard activity, with an adequate cuff size of the patient's arm. The records of readings considered to be valid were ≥ 80% of the total. Systolic and diastolic BP variability were expressed by the coefficient of variation (CV) of systolic or diastolic measurements, defined by using relative changes (CV=100 x s.d./mean). AASI, is defined as 1-(diastolic-on-systolic slope), wherein the slope was determined from a DBP vs. SBP plot by a standard regression procedure.

RESULTS

The hyperthyroid group included 36 patients with subclinical hyperthyroidism and 23 patients with overt hyperthyroidism. There were no statistically significant differences among overt hyperthyroidism, subclinical hyperthyroidism and control groups in terms of AASI (0.43±0.15, 0.38±0.12, 0.42±0.13, respectively; p=0.315). Variability of diastolic BP, as expressed by 24-hour diastolic coefficient variation (CV), was significantly higher in patients with overt hyperthyroidism than patients with subclinical hyperthyroidism (14.8±2.6 vs 12.8±2.5 %, p=0.023). There were significant positive correlations between AASI and fT3 (r=0.246, p=0.02) and fT4 (r=0.219, p=0.04) while TSH was not correlated with AASI (r=0.023, p=0.838). After adjusting for confounders, age, 24-hour systolic and diastolic BP, variability of systolic and diastolic BP (24-hour systolic and diastolic CV) and fT4 were independent predictors of AASI (r2=0.460, p<0.001)

Table 1 Demographic, ambulatory blood pressure monitoring characteristics **and biochemical characteristics of the study subjects.**

	Ohyper (n=23)	Shyper (n=36)	Control (n=25)	p
Age (years)	38.5±9.8	47.8±10.2	47.8±9	0.001[a,b]
Gender (male) [n, (%)]	8 (34.8)	11(30.6)	4 (16)	0.295
Office systolic BP (mmHg)	130.3±10.3	120.3±9.5	123.6±10.4	0.002[a]
Office diastolic BP(mmHg)	81.0±9.2	76.4±6.4	77.1±8.8	0.096
24 hour systolic BP (mmHg)	125.4±7.7	117.9±9.0	119.0±9.0	0.005[a,b]
24 hour diastolic BP (mmHg)	72.2±5.6	73.4±6.1	72.2±5.6	0.592
24 hour systolic CV(%)	9.7±2.0	9.2±1.6	10.3±2.0	0.077
24 hour diastolic CV (%)	14.8±2.6	12.8±2.5	14.1±3.3	0.023[a]
Daytime systolic BP (mmHg)	128.0±8.7	118.5±8	122.6±9.4	0.001[a]
Daytime diastolic BP (mmHg)	75.2+6.4	76.2+10.0	77.5+7.3	0.145
Night-time systolic BP (mmHg)	119.0±7.2	108.5±11.1	112.0±10.2	0.001[a,b]
Night-time diastolic BP (mmHg)	66.4±5.9	66.4±5.8	67.0±9.3	0.838
Non-dipper [n, (%)]	18 (78)	24 (75)	18 (72)	0.882
AASI	0.43±0.15	0.38±0.12	0.42±0.13	0.315
fT3 (pg/ml)	14.2±7.64	3.09±0.33	2.94±0.28	<0.001[a,b]
fT4 (ng/ml)[ǂ]	3.39 (1.57-7.77)	1.38(0.38-1.70)	1.17(0.90-1.59)	<0.001[a,b,c]
TSH (mIU/L)[ǂ]	0.005 (0.005-0.11)	0.11 (0.001-0.34)	1.32 (0.47-3.79)	<0.001[a,b,c]

ǂ: Data are given as median (minimum-maximum) or as mean±SD Ohyper:Overt Hyperthroidism, Shyper:Subclinical hyperthyroidism, BP:blood pressure, CV: coefficient of variation, AASI: Ambulatory Arterial Stiffness Index, fT4: free T4, fT3: free T3

[a]:Ohyper vs Shyper by the appropriate statistical test.

[b]:Ohyper vs Control by the appropriate statistical test.

[c]:Shyper vs Control by the appropriate statistical test.

Table 2 Independent Predictors of AASI in a Multiple Regression Analysis best fitting model (R^2=0.460)

	β	p
Age (years)	0.003	0.044
Gender	0.039	0.182
24 hour Systolic BP (mmHg)	0.008	<0.001
24 hour diastolic BP (mmHg)	-0.012	<0.001
24 hour systolic CV(%)	0.040	0.001
24 hour diastolic CV(%)	-0.044	<0.001
Non-dipper	-0.009	0.758
fT4 (ng/ml)	0.020	0.045

BP:blood pressure CV: coefficient of variation, AASI: Ambulatory Arterial Stiffness Index fT4: free T4

SUMMARY OF CONCLUSIONS

In conclusion, our study showed that AASI did not differ between overt and subclinical hyperthyroidism whereas short term BP variability was higher in overt hyperthyroidism than subclinical hyperthyroidism. Also, there was a positive relationship between AASI and free thyroid hormones. Further studies are needed to enlighten the possible relation between arterial stiffness and excess thyroid hormones. Larger prospective studies investigating the alteration in BP variability and AASI after maintaining euthyroidism may potentially broaden our understandings about vascular effects of thyroid hormones.

REFERENCES

1. S. Danzi, I. Klein. Thyroid disease and the cardiovascular system. Endocrinol Metab Clin North Am, 2014. 43(2): p. 517-28.
2. G. Schillaci, G. Parati. Ambulatory arterial stiffness index: merits and limitations of a simple surrogate measure of arterial compliance. J Hypertens, 2008. 26(2): p. 182-5.
3. J. Bahrainwala, A. Patel, K.M. Diaz, et al. Ambulatory Arterial Stiffness Index and circadian blood pressure variability. J Am Soc Hypertens, 2015. 9(9): p. 705-10.
4. P. Iglesias, M. Acosta, R. Sanchez, et al. Ambulatory blood pressure monitoring in patients with hyperthyroidism before and after control of thyroid function. Clin Endocrinol (Oxf), 2005. 63(1): p. 66-72.

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