

## The association between thyrotropin and platelet to white blood cell ratio in general population

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**Background/Aims:** Platelet to white blood cell ratio (PWR) was an available and practical indicator of the systemic inflammatory response. High serum thyroid-stimulating hormone (TSH) levels have been involved with the presence of inflammatory state and risk for developing cardiovascular disease. The aim of our study was to identify associations between TSH and PWR in healthy Korean euthyroid and subclinical hypothyroid adults.

**Methods:** Nationwide, population-based and cross-sectional data from the 2015 Korean National Health and Nutrition Examination Survey (KNHANES) were used for the analysis. A total of 1267 subjects aged  $\geq 19$  years who underwent thyroid function tests and inflammatory markers, such as white blood cell (WBC), platelet, and C-reactive protein (CRP) were included. And the subjects were subdivided into four groups, following the tertile groups based on the TSH reference range of the Korean population and an subclinical hypothyroidism (SCH) group according to the TSH levels: first tertile (T1), 0.62-1.78  $\mu\text{IU/mL}$ ; second tertile (T2), 1.79-2.70  $\mu\text{IU/mL}$ ; third tertile (T3), 2.70-6.84  $\mu\text{IU/mL}$ ; and SCH,  $>6.84 \mu\text{IU/mL}$ . We compared the PWR among the four groups.

**Results:** The mean age of the population was  $43.56 \pm 15.09$  years and the mean antithyroid peroxidase (anti-TPO) antibodies and TSH were significantly higher in women at baseline. The mean level of the PWR in all study subjects was  $41.27 \pm 10.20$ , and the PWR in men ( $39.42 \pm 9.52$ ) was significantly decreased compared to those in women ( $43.33 \pm 10.54$ ). The mean value of PWR in the SCH group was more higher compared with the other groups in the total population. And, the mean value of PWR decreased by increasing tertiles of the TSH in men (T1,  $40.49 \pm 9.74$ ; T2,  $38.98 \pm 8.92$ ; T3,  $38.57 \pm 9.85$ ,  $P=0.756$ ). However, there was no significantly differences between the PWR and TSH subgroups classified by TSH level.

**Conclusions:** Our study has found that PWR and TSH are not significantly association in the Korean general population.

Table 1. Baseline characteristics

Characteristics	Total	Men	Women	P-value
Number	1267	776	600	
Age(years)	$43.6 \pm 15.1$	$43.0 \pm 14.7$	$44.2 \pm 15.5$	0.138
BMI( $\text{kg/m}^2$ )	$23.9 \pm 3.6$	$24.6 \pm 3.4$	$23.2 \pm 3.6$	$<0.001$
WCI(cm)	$82.5 \pm 10.0$	$86.2 \pm 9.2$	$78.3 \pm 9.2$	$<0.001$
SBP(mmHg)	$116.7 \pm 15.7$	$119.5 \pm 13.8$	$113.6 \pm 17.1$	$<0.001$
DBP(mmHg)	$76.1 \pm 10.1$	$78.7 \pm 9.6$	$73.1 \pm 9.9$	$<0.001$
FBG(mg/dL)	$97.8 \pm 19.4$	$100.6 \pm 22.0$	$94.6 \pm 15.3$	$<0.001$
HbA1c(%)	$5.5 \pm 0.7$	$5.6 \pm 0.8$	$5.5 \pm 0.5$	0.018
Plt(Thous/mL)	$258.4 \pm 49.6$	$256.3 \pm 47.1$	$260.7 \pm 52.2$	0.111
WBC(Thous/mL)	$6.5 \pm 1.3$	$6.7 \pm 1.4$	$6.2 \pm 1.3$	$<0.001$
PWR	$41.3 \pm 10.2$	$39.4 \pm 9.5$	$43.3 \pm 10.5$	$<0.001$
Anti-TPO(IU/mL)	$29.29 \pm 183.31$	$12.60 \pm 36.07$	$47.83 \pm 262.52$	0.001
TSH(mIU/mL)	$2.81 \pm 3.01$	$2.47 \pm 1.49$	$3.20 \pm 4.04$	$<0.001$
Free T4 (ng/dL)	$1.25 \pm 0.18$	$1.29 \pm 0.18$	$1.20 \pm 0.16$	$<0.001$
TC(mg/dL)	$192.0 \pm 34.9$	$191.9 \pm 34.7$	$192.2 \pm 35.2$	0.916
TG(mg/dL)	$141.9 \pm 122.9$	$169.5 \pm 147.2$	$111.2 \pm 77.9$	$<0.001$
LDL-C(mg/dL)	$115.3 \pm 31.1$	$116.2 \pm 30.6$	$114.3 \pm 31.6$	0.287
HDL-C(mg/dL)	$51.2 \pm 12.5$	$47.6 \pm 10.9$	$55.1 \pm 13.0$	$<0.001$
hsCRP	$0.8 \pm 0.8$	$0.9 \pm 0.8$	$0.8 \pm 0.8$	0.020

Table 2. Clinical and biochemical characteristic stratified by tertiles of the thyrotropin reference range and subclinical hypothyroidism

	T1	T2	T3	SCH	P-value
Number	411	414	405	47	
Age(years)	$43.0 \pm 14.7$	$44.3 \pm 15.2$	$43.2 \pm 15.4$	$45.3 \pm 14.9$	0.512
Plt (Thous/mL)	$262.0 \pm 49.0$	$256.9 \pm 48.0$	$256.1 \pm 51.3$	$259.3 \pm 54.7$	0.342
WBC (Thous/mL)	$6.5 \pm 1.3$	$6.5 \pm 1.3$	$6.4 \pm 1.4$	$6.4 \pm 1.5$	0.878
PWR	$41.7 \pm 10.5$	$40.9 \pm 9.7$	$41.1 \pm 10.2$	$42.8 \pm 12.3$	0.439
Anti-TPO (IU/mL)	$13.80 \pm 54.01$	$19.12 \pm 53.36$	$23.34 \pm 114.73$	$303.31 \pm 82.349$	$<0.001$
TSH(mIU/mL)	$1.29 \pm 0.31$	$2.24 \pm 0.26$	$3.89 \pm 0.92$	$11.77 \pm 11.14$	$<0.001$
Free T4 (ng/dL)	$1.27 \pm 0.17$	$1.27 \pm 0.16$	$1.23 \pm 0.17$	$1.04 \pm 0.25$	$<0.001$
MEN					
Number	248	220	185	14	
Age(years)	$43.2 \pm 14.5$	$43.4 \pm 14.6$	$42.9 \pm 15.1$	$40.9 \pm 17.0$	0.846
PWR	$40.5 \pm 9.7$	$39.0 \pm 8.9$	$38.6 \pm 9.9$	$38.6 \pm 9.8$	0.159
Anti-TPO (IU/mL)	$10.58 \pm 32.01$	$11.79 \pm 24.47$	$12.89 \pm 42.42$	$57.28 \pm 96.89$	$<0.001$
TSH(mIU/mL)	$1.31 \pm 0.31$	$2.22 \pm 0.27$	$3.83 \pm 0.92$	$8.77 \pm 1.74$	$<0.001$
Free T4 (ng/dL)	$1.31 \pm 0.17$	$1.30 \pm 0.17$	$1.28 \pm 0.18$	$1.16 \pm 0.25$	0.016
Women					
Number	163	184	220	33	163
Age(years)	$42.6 \pm 15.0$	$45.4 \pm 16.0$	$44.0 \pm 15.7$	$47.2 \pm 13.7$	0.270
PWR	$43.6 \pm 11.3$	$43.1 \pm 10.0$	$43.2 \pm 10.0$	$44.6 \pm 12.9$	0.868
Anti-TPO (IU/mL)	$18.70 \pm 76.04$	$27.87 \pm 73.58$	$32.14 \pm 150.33$	$407.69 \pm 96.607$	$<0.001$
TSH(mIU/mL)	$1.27 \pm 0.31$	$2.25 \pm 0.25$	$3.93 \pm 0.92$	$13.05 \pm 13.09$	$<0.001$
Free T4 (ng/dL)	$1.23 \pm 0.15$	$1.23 \pm 0.14$	$1.18 \pm 0.15$	$0.99 \pm 0.23$	$<0.001$