

# Estimation of The Pulse Wave Velocity Through Some Cardiovascular Risk Factors

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## Objectives:

Increased arterial stiffness is an independent predictor of cardiovascular disease. Arterial stiffness can be easily and noninvasively assessed by measuring the pulse wave velocity (PWV) as the present gold standard measurement of regional arterial stiffness. Arterial stiffness increases with age, hypertension, dyslipidemia, smoking, obesity, increased plasma glucose, elevated heart rate and endothelial dysfunction.

In this study, we aimed to perform calculations based on estimating the arterial stiffness measurement indirectly via some other cardiovascular risk factors.

## Methods:

In this study, we recruited 1054 patients. 469 of them were females (44.5%) and the mean ages of the female and male subjects were  $48.3 \pm 13.5$  and  $42.4 \pm 16.2$  years, respectively. The subjects were patients having arterial stiffness measurements applied in the internal medicine outpatient clinics.

## Results:

The mean body mass index (BMI), pulse wave velocity (PWV), augmentation index (Aix) and central aortic pressure (CAP) measurements of the patients were  $27.7 \pm 5$  kg/m<sup>2</sup>;  $8.5 \pm 1.8$  m/sec;  $22.3 \pm 16.5$  % and  $127.4 \pm 22.6$  mmHg, respectively. Among the cardiovascular risk factors and laboratory measurements, only seven (age, gender, smoking, body mass index, systolic and diastolic blood pressures, heart rate) were found associated with pulse wave velocity measurements. A linear regression analysis was performed to estimate pulse wave velocity measurements through these factors. The final equation of the estimated PWV was formulated below (Formula).

PWV<sub>estim</sub> = -

$112,91446217 + 0,0211937383703 * (\text{Age}^1,173930194946) + 45,87673631727 * (\text{BMI}^0,02939903956456) + 49,38948049469 * (\text{Systolic}^0,01661333628177) + 5,652578136932 * (\text{Diastolic}^0,1699440306161) + 0,07210998120011 * (\text{HR}^0,8905313062488) + (\text{Gender} * 0,03561363100352) + (\text{Smoking} * 0,2507576021845)$

(Blood pressures: mmHg, Age: years, BMI: kg/m<sup>2</sup>, Heart rate: beats per minute, Gender: 1 male, 0 female; Smoking: 1 yes, 0 no)

## Conclusions:

PWV measurement is important in representing the cardiovascular risk. We think that estimation of the PWV via this formula where there is no real availability of PWV measurement, may be useful for clinicians to determine the future cardiovascular risk.

## References:

1. HS Lim and GYH Lip. Arterial stiffness in diabetes and hypertension. *Journal of Human Hypertension* (2004) 18, 467–468.
2. Sungha Park and Edward G. Lakatta. Role of Inflammation in the Pathogenesis of Arterial Stiffness. *Yonsei Med J* (2012) 53(2):258-261.

