

A Study of the Evaluation of the Degree of Arterial Stiffness Employing the Pulse Wave Velocity (PWV) and the Arterial Stiffness Index (ASI)

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Goal: This research comprised a comparative study of the clinical usefulness, as arterial stiffness indices, of the ABI (ankle brachial index), the PWV (pulse wave velocity) and the ASI (Arterial Stiffness Index)

Method:

A total of 343 outpatients (average age 67 years, 153 males, 190 females, mean blood pressure of 135/78mmHg) participated in this study. Among these participants, 186, 153, and 85 individuals were coping respectively with hypertension, hyperlipidemia, diabetes, and 136 individuals were smokers. A logistics retrogression analysis was performed and studied for those influence factors leading to ischemic heart disease (82 individuals) and cerebral infarction (31 individuals) from among the patient factors of ABI, PWV, age, sex, BMI, hyperlipidemia, diabetes, hypertension, smoking, and serum creatinine. 175 subjects (average age 66 years, mean blood pressure of 136/78mmHg, 104 hypertension treatment recipients) among those above were divided into two groups: (1) hypertension patients on antihypertensive medication; and (2) patients without hypertension not on antihypertensive medication. The ASI for both groups was measured with CardioVision® (a device based on the oscillometric method), which calculates the ASI from the brachial artery's pulse wave pattern obtained during the process of cuff decompression, and then compared with pulse pressure and PWV.

Results:

(1) High pulse pressure, hyperlipidemia, and smoking proved in order of significance as factors strongly connected with the advent of ischemic heart disease. Hyperuricemia, high PWV, and low ABI proved in order of significance as factors strong connected with the advent of cerebral infarction, but neither diabetes nor BMI indicated any significant correlation with either ischemic heart disease or cerebral infarction. (2) When the correlation of ASI, PWV and pulse pressure to age within the hypertension and non-hypertension groups was evaluated, PWV and pulse pressure demonstrated no difference in correlation (inclination of retrogression line) with age from within either of the two groups. On the other hand, ASI clearly indicated a high value in conjunction with age in the hypertension group, and a significant difference was admitted in the inclination of the retrogression line.

Conclusion:

This study confirmed ABI and PWV as independent factors strongly related to the advent of cerebral infarction and furthermore and further demonstrated the clinical usefulness and appropriateness of ASI as an indicator of arterial stiffness.