

COMPARISON OF PULSE WAVE VELOCITY, AUGMENTATION INDEX AND AORTIC SYSTOLIC BLOOD PRESSURE MEASURED IN STATIC CONDITIONS BY THE MOBIOGRAPH AND THE SPHYGMOCOR DEVICES IN END-STAGE RENAL DISEASE PATIENTS

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BACKGROUND/AIMS: A novel, automatic, oscillometric, brachial cuff-based device (Mobil-o-Graph, IEM, Stolberg, Germany) provides the ability to assess non-invasively aortic systolic blood pressure (aSBP), aortic augmentation index (Alx) and pulse wave velocity (PWV) in ambulatory conditions. Previous studies comparing the validity of this device with the currently most widely applied non-invasive tonometry-based device (Sphygmocor, ArtCor, Sydney, Australia) showed acceptable agreement between the 2 devices for aSBP and Alx measured in static conditions in healthy volunteers and hypertensive individuals and slight underestimation of PWV by the Mobil-O-Graph device [1-4]. The aim of this study was to investigate for first time the agreement between these 2 devices in hemodialysis patients.

MATERIAL AND METHODS: In 49 consecutive patients receiving maintenance hemodialysis, aSBP, Alx adjusted for 75 heart beats/min (Alx(75)) and PWV were measured with both devices (order: Sphygmocor then Mobil-O-Graph) after 10 min of rest in the supine position, according to the manufacturer's operational recommendations. Calibration of aortic pulse waveform for the Sphygmocor device was performed with the use of brachial BP measurements obtained with a mercury sphygmomanometer. Statistical analysis was performed with the Statistical Package for Social Sciences (SPSS 17.0) for Windows XP. Comparison of measurements between the 2 devices was performed with the paired samples t-test. Linear regression analysis was performed to assess the correlation of measurements of Sphygmocor and Mobil-O-Graph devices and we constructed the relevant Bland-Altman plots.

RESULTS: Baseline characteristics of study participants are depicted in Table 1. A total of 49 hemodialysis patients (30 male and 19 female) with a mean age of 59.6±15.7 years participated in this study. As shown in Figure 1, mean aSBP, Alx(75) and PWV measured with the Sphygmocor device did not significantly differ from the relevant measurements obtained with the Mobil-O-Graph device (aSBP: 136.3±20.5 vs 132.7±19.1 mmHg, P= 0.113; Alx(75): 28.7±9.9 vs 30.0±12.2%, P= 0.477; PWV: 9.7±2.8 vs 9.3±2.0 m/sec, n=42, P=0.344, for Sphygmocor vs Mobil-O-Graph respectively). The difference for aSBP was similar to and explained by the difference in the peripheral SBP used for waveform's calibration (147.1±21.5 vs 144.2±20.4 mmHg, P=0.274, for Sphygmocor vs Mobil-O-Graph respectively). In addition, measurements of all 3 hemodynamic parameters obtained with the Sphygmocor device exhibited strong significant associations with the relevant measurements taken with the Mobil-O-Graph device (r=0.697, P<0.001 for aSBP, r=0.347, P<0.05 for heart rate-adjusted Alx and r=0.613, P<0.001 for PWV, respectively) (Figure 2). The Bland-Altman Plots for aSBP, heart rate-adjusted Alx and PWV showed acceptable agreement between the 2 devices without evidence of systemic bias (Figure 3).

CONCLUSIONS: The present study showed for first time acceptable agreement between the 2 devices for aSBP, Alx and PWV in hemodialysis patients, the latter being slightly underestimated by the Mobil-O-Graph compared to Sphygmocor device. The Bland-Altman Plots for aSBP, heart rate-adjusted Alx and PWV showed acceptable agreement between the 2 devices without evidence of systemic bias.

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Table 1: Baseline characteristics of study participants.

N	49
Age (years)	59.6±15.7
Sex (male/female)	30/19
Weight (kg)	71.9±15.6
Height (m)	1.67±1.0
BMI (kg/m ²)	25.5±5.5
Dialysis vintage (months)	47.3±6.9

Figure 1. Comparison of a) aSBP, b) Alx(75), and c) PWV levels obtained in static conditions between the Sphygmocor and Mobil-O-Graph devices in hemodialysis patients.

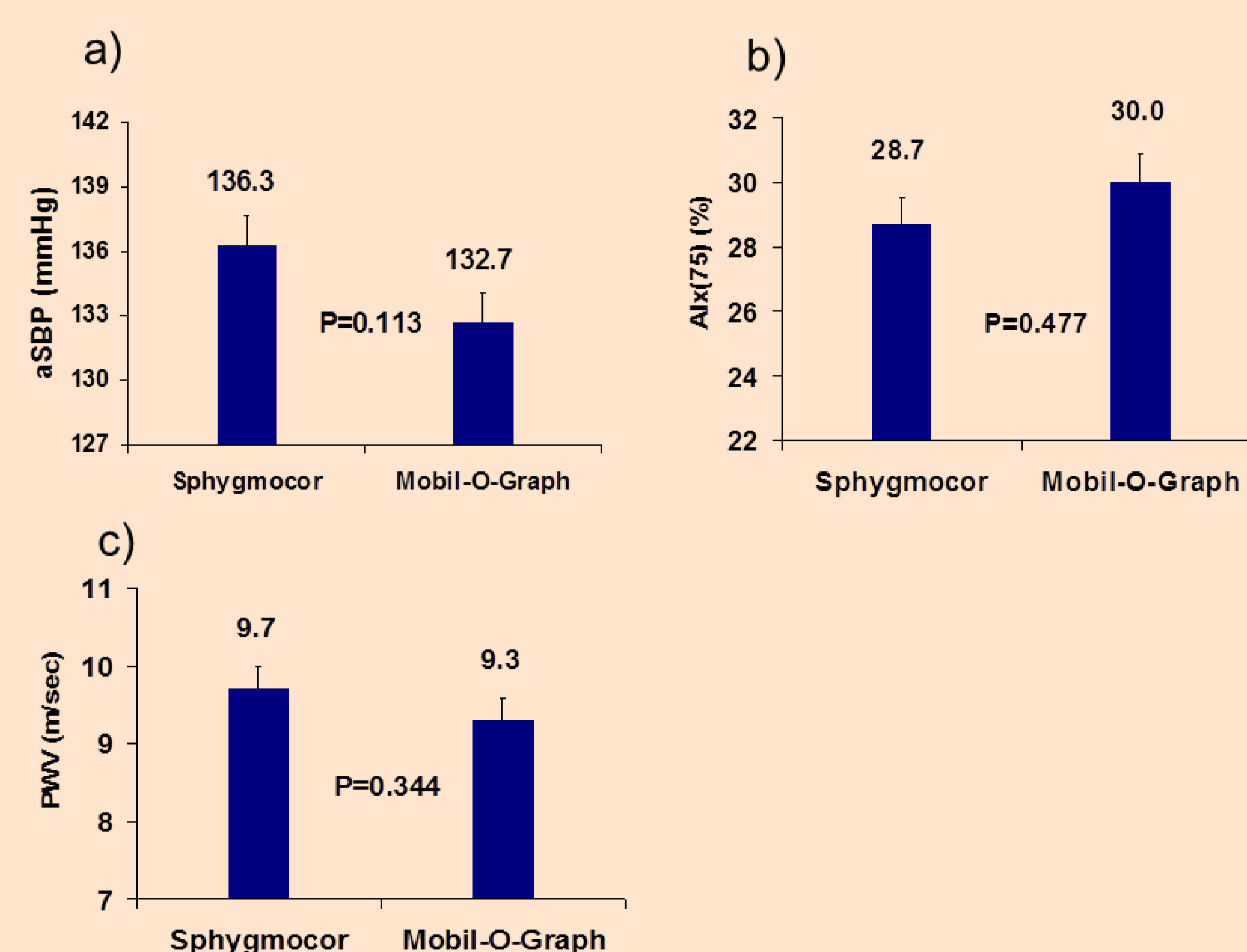


Figure 2. Linear regression analysis of measurements of a) aSBP, b) Alx(75), and c) PWV between the Sphygmocor and Mobil-O-Graph devices in hemodialysis patients.

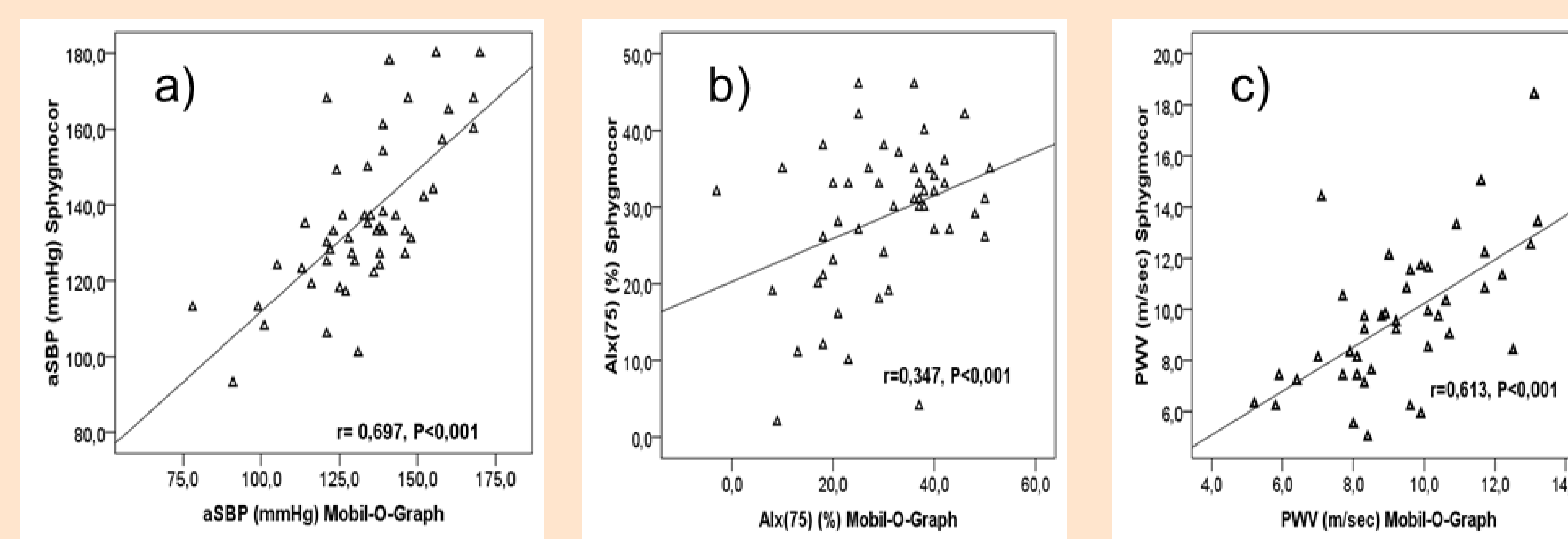


Figure 3. Bland-Altman plots of the Mobil-O-Graph derived measurements of a) aSBP, b) Alx(75), and c) PWV versus the Sphygmocor derived measurements.

