Table 3 Comparison of SFA and DFA haemodynamic parameters.

Haemodynamic parameters	SFA artery (mean ± std)	DFA artery (mean ± std)	Significance level
Linear velocity V_{Mean} (cm/sec)	9.60 ± 3.88	10.67 ± 5.02	$p = 0.508$
Antograde linear velocity V_{Ant} (cm/sec)	13.33 ± 3.46	11.29 ± 4.83	$p = 0.001$
Retrograde linear velocity V_{Ret} (cm/sec)	−3.82 ± 1.37	−0.67 ± 0.46	$p = 0.001$
Acceleration time T_{ACC} (sec)	0.14 ± 0.02	0.10 ± 0.02	$p = 0.001$
Deceleration time T_{DEC} (sec)	0.21 ± 0.02	0.23 ± 0.02	$p = 0.001$
Mean shear rate $S_{V_{mean}}$ (s^{-1})	63.93 ± 27.44	79.74 ± 36.88	$p = 0.036$
Antegrade shear rate $S_{V_{ant}}$ (s^{-1})	89.46 ± 25.72	83.21 ± 34.66	$p = 0.080$
Retrograde shear rate $S_{V_{ret}}$ (s^{-1})	−25.10 ± 10.41	−4.91 ± 3.22	$p = 0.001$
Blood flow Q (ml/min)	162.06 ± 64.30	148.35 ± 77.79	$p = 0.224$
Peak linear velocity V_{Max} (cm/sec)	74.02 ± 12.52	52.23 ± 12.38	$p = 0.001$
Minimal linear velocity V_{Min} (cm/sec)	−23.37 ± 6.70	−7.39 ± 3.07	$p = 0.001$
Oscillatory index OSI	0.22 ± 0.08	0.06 ± 0.04	$p = 0.001$

Mean values of haemodynamic parameters for superficial (SFA) and deep femoral (DFA) arteries. Data pooled together from both sides. The sedentary young women group ($n = 25$; 2 sides) mean value ± standard deviation are reported in table. p value refers to a Man–Whitney Rank sum test, significant p values are indicated with bold.

the leg vasculature during seated posture (our subjects were sedentary), and changes of artery curvature.[22,49] That is why a slightly lower (and different) daily activity of one leg and a slightly higher of the other may cause a small, hence statistically significant, asymmetry, which appears negligible in comparison to the bilateral difference of peripheral artery disease patients. We can merely speculate that the presently observed unilateral changes of femoral artery haemodynamic parameters of young healthy and sedentary women could be considered as an origin of potential genesis of artery structure pathological changes later in older age.

Conclusions

Most of the young and healthy women (roughly 80%) leading a sedentary life style exhibited small anatomical (the direction and type of the ramification, morphometric artery diameters) and haemodynamic (blood flow velocity related parameters) bilateral asymmetry of femoral arteries in paired legs.

Limitations of the study

Despite the careful planning of experimental design and the accurate implementation of all procedures, there are still several limitations that may potentially interfere with present findings and therefore results should be interpreted with precaution.

Arterial structure has been detected via sonography; however additional imaging methods (such as CT or MRI) might be used as a reference. Although it is known that a high-resolution ultrasound system used by an experienced specialist can provide results with comparatively high precision concerning the structure and geometry of a large artery,[50] presently most (peripheral artery disease) PAD diagnosis are made using ultrasound Doppler.

This study comprised a relatively small sample size (25 women), which may not fully reflect characteristics of general population. However, use of within a subject comparison design with a large individual sample size (30 beats) and full randomisation may yield to significant results. The powers of the applied statistical tests were verified and always were in the range to consider statistics significant.

Subject anthropometric parameters (muscle mass) were obtained by callipers and a measuring tape and not by more reliable methods such as CT, MRI or DEXA. However there were numerous studies showing that anthropometric methods are valid and their results are closely correlated to CT and MRI.[51,52] Moreover correlation analyses performed in the present study require only relative values of muscle volume and mass, thus errors of absolute values can be neglected.

Ultrasound Doppler imaging method instead of others more prone to operator mistakes has been utilised for measurement of basal values of artery haemodynamic parameters (Doppler waveform derived indices). Special attention has been paid for this issue as it is crucially important for reliable bilateral comparison of femoral artery haemodynamic parameters. To avoid inter observer variability, sonographic scanning on both sides were performed by the same experienced sonographer (Z.M.). Prior to this study our group estimated (CV%) variability coefficients (including: intra observer, ultrasound device, automated analyses software) which were similar or even lower to those reported by Green at al, and Hussain et al. with a slight differences for different femoral arteries and different haemodynamic parameters (for SFA 3%–8%; for DFA 6–12%, depending on measured parameters). The whole experiment design was intended to avoid different confounding factors which might compromise results.

The daily activity level has been obtained by questionnaires, which is a rather subjective method in comparison to techniques such as personal activity monitors. We feel that the women have answered questions truthfully, and even if the data had been slightly different from reality, full time student daily activity level shouldn't differ notably and are considerably lower than those of the trained athletes.

Disclosures

None.

Acknowledgements

The authors thank Karina Volceka for support in anthropometric measurements, this research has been financially supported by two EU ESF projects: " Support for Doctoral Studies at University of Latvia", Nr.ESS2009/77 and "Biophotonics Research Group", Nr.ESS2009/80.

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