Correlation between blood rheological properties and red blood cell indices (MCH, MCV, MCHC) in healthy women

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Aim: The intention of this prospective trial was to investigate the physiological associations between blood rheological parameters and red blood cell indices of mid-age healthy women prior elective gynecological surgeries.

Methods: Red blood cell deformability during exposure to low (RBC 1.2, 3.0), moderate (RBC 6.0, 12.0) and high shear forces (RBC 30.0, 60.0), RBC aggregation during stasis (E0) and low shear (E1; 3 s -1) and plasma viscosity (Pv) were correlated with red blood cell-indices (RBC-I: MCV, MCH, MCHC). Patients with infective, chronic or malign diseases, known pregnancy or extreme BMI were excluded.

Results: In total 286 women were included in this evaluation. A significant correlation was found between Pv (mean ± SD: 1.17 ± 0.12 mPa s) and RBC aggregation (E0: 12.6 ± 6.3; E1: 17.9 ± 7.3) with age and BMI, but not with RBC-I. RBC deformability correlated positively with age, MCV and MCH but inversely with MCHC. The correlation between RBC-I and RBC deformability was most remarkable during moderate shear force exposure. Neither hemoglobin nor hematocrit were correlated with RBC deformability or RBC-I.

Conclusions: In healthy mid-age women, cell volume and hemoglobin content have a high influence on the RBC deformability. Low MCHC und high MCV were correlated with an increase in deformability and vice versa. Age was associated with an increase in all determinants of blood viscosity, while BMI showed no influence. MCV, MCHC or MCH had no impact on RBC aggregability.