Equations of blood viscosity may provide a prediction of the “optimal” hematocrit (hct) as the Hct resulting in the highest value of the bell-shaped curve of hematocrit/viscosity ratio h/v. We investigated if overweight and obesity have an influence on these parameters. We compared 32 normal weight subjects, 40 overweight (BMI 25-30) and 38 obese subjects. There was no difference in the theoretical curve of h/v. The actual h/v is the same in the 3 groups but is always higher than the theoretical h/v in all groups.

The actual h/v is lower in overweight than controls (p=0.011). Modelling yields the same value of theoretical optimal hct across BMI classes. The 3 groups have the same values of actual Hct, but actual is significantly lower than optimal in all cases (p<0.001). Hematocrit is lower than predicted due to a discrepancy between predicted and actual h/v which is due to the inter-subject variability of RBC rigidity… The discrepancy between optimal and actual h/v is negatively correlated to RBC rigidity indexes even if the model uses a fixed value of these indexes. Thus keeping in mind that the optimal Hct should not be the same in the various parts of the vascular bed, its theoretical prediction with Quemada’s equation appears to predict a value higher than actual hematocrit but well correlated to it, and the agreement between optimal and actual Hct is dependent on RBC flexibility.