

## How valid is 50 s<sup>-1</sup> for measuring viscosity of liquids?

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Currently, the oral shear rate of 50 s<sup>-1</sup> has been adopted as the standard at which viscosity measurements for thickened liquids are measured. However, there is evidence to suggest that this shear rate might not be appropriate to model the processes in the mouth. In this two-part research, we first looked at the relations between perceived and apparent viscosity at different shear rates of two types of liquids (barium and non-barium based liquids) that had been thickened with corn starch and xanthan gum. This was followed by a second experiment where we compared the sensory and rheological properties of liquids thickened with xanthan gum, guar gum, and carboxymethyl cellulose to assess the validity of 50 s<sup>-1</sup> as the current shear rate standard. Rheological measurements were taken with a rheometer fitted with concentric cylinder geometry at shear rates between 1 and 1000 s<sup>-1</sup>, while sensory perception of viscosity was measured by a trained panel. From the first experiment, it was apparent that media affects perceived viscosity; the best relations between perceived and apparent viscosity were observed at the approximate shear rates of 10 s<sup>-1</sup> and 100 s<sup>-1</sup> for non-barium and barium thickened liquids, respectively. In the second experiment, panelists perceived significant differences between thickened liquid samples that had been matched for apparent viscosity at 50 s<sup>-1</sup>. At low viscosity levels, shear rates above 50 s<sup>-1</sup> best modeled the relations between perceived and apparent viscosity. However, no patterns were observed for liquids at medium or high viscosity levels, suggesting that instrumental shear of liquids is not a good model of oral processes. In conclusion, 50 s<sup>-1</sup> is not an appropriate estimation of the oral shear rate, and shear rate does not account for the effect of the medium being thickened and viscosity level of liquids.