

Concurrent Session 12: Interventions in Obesity

The 'caffeine-sweetness' effect; potential reduction of energy in caffeinated sugar-sweetened soft drinks

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Background – Excessive consumption of sugar sweetened beverages (SSB) is a contributing factor in the occurrence of overweight and obesity. The high energy intake, low satiation, high glycemic index, and intense marketing are all thought to contribute to their over consumption. In addition, the role of the mildly-addictive chemical caffeine in SSB has been questioned (Griffiths and Vernotica, 2000, Keast and Riddell, 2007). We have previously shown that low concentrations of caffeine may decrease sweetness of sugars and thereby result in excess energy in SSB formulations (Ebbeling et al., 2006).

Objective – Without noticeably affecting flavour, to determine potential energy reduction when decreasing sucrose concentration from caffeinated and de-caffeinated SSB.

Design – Human psychophysical taste evaluations in water, sucrose and model SSB. Triangle forced-choice ascending method of limits was used to determine caffeine taste threshold in water and sucrose (n= 62). Directional paired comparison tests to determine 1/ the influence of caffeine on sweetness of sucrose (n= 23), and 2/ the non-perceivable difference when decreasing the sucrose and caffeine concentrations in a model SSB (n= 30).

Outcomes – Caffeine, at sub-threshold concentrations in common SSB (0.67mM) can be perceived in sucrose solutions because it significantly inhibits sweetness ($p<0.001$), the 'caffeine-sweetness effect'. Presumably co-removal of caffeine and sucrose could be achieved without affecting the sweetness of the SSB. Removing caffeine from the model SSB allowed an energy reduction of 137.4 KJ per 500 ml serving (12.6% sucrose reduction) without noticeably affecting flavour for 80% of the population. The energy reduction possible without co-removal of caffeine was a more modest 32 KJ per 500 ml serving (3.5% sucrose reduction).

Conclusion – Sub-threshold concentrations of caffeine suppress sweetness resulting in higher concentrations of sugars in SSB. Excessive consumption of SSB is linked to the obesity epidemic, and we suggest the removal of caffeine and subsequent removal of 137.4 KJ energy will have long term public health benefits.