

Statistical Analysis Plan

Effects of tea consumption on blood pressure, blood glucose and cognition

All data will be processed and checked in excel before analysis is performed in IBM SPSS (v.29). Participant characteristics will be analysed and summarised using descriptive statistics. These include age, gender, height, weight and BMI (kg/m^2).

All data will be examined for outliers and assumptions using histograms and boxplots (normal distribution of residuals and homogeneity of variance) for each inferential analysis. For continuous data (blood pressure and blood glucose) these will be assessed for normal distribution using Shapiro-Wilks and visual inspection of Q-Q plots.

Linear Mixed Models

All data will be analysed using Linear Mixed Models (LMM). Linear Mixed Models (LMM) with drink (hibiscus or placebo), session (or time) and visit as fixed factors and participants as a random factor were performed for each outcome. Baseline for each dependent variable was included as a fixed factor. An unstructured covariance matrix was used (West et al 2022). Age, gender and BMI were added as covariates in the glucose and blood pressure models. For each cognitive test outcomes the same covariates were added along with blood pressure and glucose at the time of each cognitive test.

The procedure for model selection for analysis of each outcome variable was as follows. All main effects and interactions were requested in the first model and all covariates were included. The model fit, F values and significance of main effects, interactions and covariates were examined.

Non-significant covariates were removed. Non-significant interactions were removed, starting with highest order interactions. Each resulting model was compared to the previous model using the Akaike's Information Criterion (AIC) which gives an indication of the amount of remaining unexplained variance after the model has been fitted, where a smaller AIC value indicates a better model fit (Burnham and Anderson 2004). If an improvement in model fit was found, other non-significant effects were removed and again the AIC criterion used to evaluate the model fit. Models were chosen on the basis of 'best fit', and interaction terms and covariates that improved the fit were retained. F values and corresponding significance values for the main effects and interactions in the final selected model for each outcome variable are reported.



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Where outliers were indicated based on standardized residuals the analysis was re-run with the outlying data points excluded. Only where the exclusion led to a difference in inferences that could be drawn from the findings, were the data permanently removed and the corresponding final models reported.

Bonferroni adjusted pairwise comparisons explored any significant effects (defined as $p < 0.05$). Where p-values were near significant (defined as $p < 0.07$), pairwise comparisons were also explored (Huck, 2015). All data is reported as means (SE).

References

Burnham K, Anderson D. 2004. Multimodel inference: understanding AIC and BIC in Model Selection. *Sociological Methods and Research*. 33:261-304.

Huck, S. W. (2015). *Statistical Misconceptions* (Classic Ed). Routledge.

West B, Welch K, Galecki A, Gillespie B. 2022. *Linear Mixed Models: A Practical Guide Using Statistical Software*. 3rd Edition ed. Chapman and Hall/CRC.