

Study of the impact of domestic cooking on the total phenolic content of fresh and dried culinary herbs and spices

J. Nixon¹, P. Sinnakandu¹ and M. Chohan¹

¹Department of Health Sciences, Faculty of Sports, Allied Health and Performance Sciences, St Mary's University, London, UK

Culinary herbs and spices help improve food flavour in cuisine all over the globe and possess some of the richest sources of polyphenols in edible plant foods which are linked to human health benefits^(1–3). Food processing can affect these constituents and therefore may impact the health benefits these plants may confer⁽⁴⁾. This study aimed to assess the impact of several commonly used domestic cooking methods on the total phenolic content, assessed via the total phenolic content (TPC) assay, of fifty-one culinary herbs and spices, fresh and dried.

Herbs and spices uncooked (aqueous extracts), microwaved with water (4 min), heated without medium in a non-stick pan (5, 10, 15 and 20 mins) and stewed with water (30, 60 and 120 min) were tested (n = 3) for TPC, expressed in gallic acid equivalent (GAE). TPC for uncooked plants were ranked from very low (below 50 GAE mg/100g) to very high (over 4000 GAE mg/100g). Pearson correlation was used to compare the uncooked TPC data measured in the current study with data published in the Phenol Explorer database⁽⁵⁾.

Normality of TPC data distribution was determined via the Shapiro-Wilks test. Levene's test was conducted to check the homogeneity of variances of parametric data, followed by a one-way ANOVA to assess for significant differences between treatments, and Fishers LSD *post hoc* analysis to determine the source of differences. Where homogeneity of variances was not assumed ($P < 0.05$), a Welch test was conducted and this value was used instead of the one-way ANOVA value. Non-parametric data were analysed via the Kruskal-Wallis and *post-hoc* pairwise comparison tests. All TPC data for all culinary herbs and spices tested were pooled in a 2-way ANOVA, with a Tukey *post hoc* analysis to assess the effects of treatments and plants, with the level of significance reduced to 0.01.

Dried herbs and spices were significantly higher in TPC than their fresh counterparts ($P < 0.01$). Compared to uncooked extracts, microwaving increased the TPC by 18% ($P < 0.01$). Compared to uncooked extracts, heating in a non-stick stir-frying pan caused a significant decrease in TPC, averaging 14% ($p < 0.01$), similar between the 4 lengths of times (11–17%). Compared to uncooked extracts, stewing significantly increased the TPC ($p < 0.01$) by 26% at 30 min, by 39% at 60 min and by 46% at 120 min. With data in congruence with Phenol Explorer Database, the three herbs and spices with the highest TPC estimated values in this study were clove (bud ground), cinnamon (dried ground root) and mint (dried leaf); the three lowest TPC estimated values were chives (fresh leaf), ginger (fresh root) and garlic (fresh chopped clove).

Therefore, heating culinary herbs and spices lessens polyphenols available to support human health, whilst microwaving and stewing with water favour increases.

References

1. Zheng W & Wang SY (2001) *J Agric Food Chem* **49**(11), 5165–5170.
2. Carlsen MH, Halvorsen BL, Holte K *et al.* (2010). *Nutr J* **9** (1), 1–11.
3. Koch W (2019) *Nutrients* **11**(5), 1039.
4. Rothwell JA, Perez-Jimenez J, Neveu V *et al.* (2013) *Database*
5. Pérez-Jiménez J, Neveu V, Vos F *et al.* (2010) *Database*