

Summer Meeting, 4–6 July 2011, 70th Anniversary: From plough through practice to policy

The impact of cooking and digestion on the antioxidant capacity and polyphenol content of common culinary spices

I. Baker, M. Chohan and E. I. Opara

School of Life Sciences, Kingston University, Kingston upon Thames, KT1 2EE, UK

Polyphenols are ubiquitous phytochemicals present in plants and plant derived foods such as spices and their antioxidant properties have been linked to their postulated health benefits⁽¹⁾. Spices are often subjected to both cooking (C) and digestion (D), however, there is little if any data on the impact of these factors on their polyphenolic antioxidant activity. Thus, the extent to which these processes impact the antioxidant capacity (AC) and total phenolic content (TPC) of spices were examined in the present study.

Aqueous control samples and cooked samples of spices (1 g cinnamon, 1 g nutmeg or 0.1 g clove) were prepared, with cooked samples further subjected to *in vitro* digestion⁽²⁾. The ABTS+• decolourisation assay⁽³⁾ was used to analyse the AC of each sample and expressed as TEAC $\mu\text{mol/g}$. TPC was determined using Folin–Ciocalteu reagents⁽⁴⁾ and was expressed as GAE (mg/g).

Cooking alone did not have a significant impact on the AC of cinnamon, but did increase TPC to a significant ($P<0.05$) level. The AC of clove was significantly lowered ($P<0.05$) by C but was significantly increased ($P<0.05$) following C and D. In nutmeg, C significantly increased ($P<0.05$) AC, but had no significant impact on TPC. C and D had no significant impact on either the AC or TPC of cinnamon, yet in nutmeg both variables were significantly increased ($P<0.05$). The TPC and the AC of clove were significantly higher ($P<0.05$) following C and D.

Spice	TEAC ($\mu\text{mol/g}$; n 3)	SD	GAE (mg/g; n 3)	SD
Cinnamon, uncooked	361.2	21.5	29.8	0.6
Cinnamon, cooked	369.3	13.8	34.1*	0.3
Cinnamon, cooked and digested	386.4	27.9	34.5*	0.9
Clove, uncooked	3487.8	20.2	296.9	9.2
Clove, cooked	2298.2*	149.6	292.0	17.1
Clove, cooked and digested	3228.7†	320.3	341.1*†	22.1
Nutmeg, uncooked	37.5	1.4	1.8	0.8
Nutmeg, cooked	64.8*	1.3	6.8	0.1
Nutmeg, cooked and digested	278.1*†	8.7	16.9*†	4.2

Mean values were significantly different from uncooked samples (ANOVA, followed by Tukey's test): * $P<0.05$. Mean values were significantly different from cooked samples (ANOVA, followed by Tukey's test): † $P<0.05$.

In conclusion, although cooking, and cooking followed by digestion, affected TPC and/or AC this effect was not consistent for the spices investigated and thus no clear relationship emerged. Further work on the impact of these factors on other biological properties of culinary spices is under way.

1. Manach C, Scalbert A, Morand C *et al.* (2004) *Am J Clin Nutr* **79**, 727–747.
2. Garret DA, Failla ML & Sarama RJ (1999) *J Agric Food Chem* **47**, 4301–4309.
3. Re R, Pellegrini N, Proteggente A *et al.* (1999) *Free Radic Biol and Med* **26**, 1231–1237.
4. Stoilova I, Krastanov A, Denev P *et al.* (2007) *Food Chem* **102**, 764–770.