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Effect of cooking on polyphenol bioaccessibility and digestibility of porridge oats

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Oat-based products have gained considerable attention in recent years as they are a rich source of the soluble fibre, α -glucan. In addition oats contain large amounts of antioxidants such as vitamin E and bioactive phytochemicals including various phenolic compounds and avenanthramides⁽¹⁾. Certain polyphenols are known to reduce the glycaemic response to carbohydrate containing foods. We have previously shown a significant negative correlation between the polyphenol content and the amount of rapidly digested starch (RDS) of raw oats⁽²⁾. The objective of the present study was to investigate the polyphenol content and bioaccessibility of cooked oat samples and to determine the digestibility of porridge oats after cooking.

Ten commercially available porridge oats (S1–S10) were cooked according to the manufacturers' instructions and subjected to *in vitro* digestion⁽³⁾. The amount of rapidly digested starch (RDS) was measured in the samples after 20 minutes during the intestinal phase⁽⁴⁾. Polyphenol contents of cooked oat porridges were measured by the Folin-Ciocalteu method⁽⁵⁾ both before and after an *in vitro* digestion procedure⁽⁶⁾ and expressed as Gallic Acid Equivalents (GAE).

	PP Uncooked (mg GAE/g)		PP Cooked (mg GAE/g)		RDS Uncooked (mg/g sample)		RDS Cooked (mg/g sample)	
	Mean	SE	Mean	SE	Mean	SD	Mean	SD
S1	1.67	0.01	4.38	0.14	258.6	23.1	40.4	1.9
S2	1.65	0.02	4.35	0.10	250.6	26.4	38.7	3.2
S3	1.85	0.04	4.82	0.10	265.4	12.5	45.8	5.4
S4	1.66	0.02	5.21	0.17	269.6	28.0	49.2	1.7
S5	1.80	0.03	5.63	0.13	520.6	47.2	54.3	4.0
S6	1.70	0.03	4.30	0.08	298.4	28.1	48.1	1.6
S7	1.68	0.01	4.81	0.21	301.6	24.3	54.6	8.0
S8	1.81	0.03	4.43	0.06	118.9	21.0	51.8	8.9
S9	1.64	0.02	4.29	0.16	244.0	26.6	49.7	2.0
S10	1.71	0.03	4.09	0.04	206.4	16.1	57.5	2.9

Values are means of three independent experiments. PP = polyphenol; RDS = rapidly digested starch.

Cooking increased the polyphenol release from porridge oats. There was an increase in the polyphenol release of all the porridge oats samples following *in vitro* digestion. There was a significant difference between uncooked and cooked porridge oats in their *in vitro* digestibility ($P < 0.01$). Previously we have seen a significant ($P < 0.01$) negative correlation between the polyphenol content and RDS ($r = -0.743$) of pure raw oats samples², which does not seem to exist when we compare cooked porridge oats with added ingredients such as sugar and fruits. In conclusion, cooking has an important role to play in the bioaccessibility of polyphenols from porridge oats. Furthermore, cooked oats rather than raw oats (as commonly consumed in yoghurt products) may have reduced digestibility of starch. Future work will seek to investigate the glycaemic response to raw and cooked oat samples *in vivo*.

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