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Carotenoid content and antioxidant activity of fourteen tomato ketchups available in the UK

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Carotenoids are a class of phytonutrient present in a variety of fruits and vegetables. Tomatoes (and their products) can be a particularly good source of carotenoids (especially lycopene) and their consumption is correlated with a reduced risk of some cancers (e.g. prostate cancer⁽¹⁾) and CVD⁽²⁾. Several factors have resulted in an increase in tomato ketchup consumption in the Western world⁽³⁾ that may be viewed as detrimental, but may also be beneficial to health. At present there is little information on the carotenoid content of ketchups available in the UK.

Lycopene and β -carotene were extracted from fourteen different ketchups (diluted 1 in 10 with distilled water) using dichloromethane then analysed by HPLC with detection at 480 and 460 nm respectively after separation on a C₃₀ column⁽⁴⁾. Antioxidant activity (AA) was assessed on the lipophilic extracts spectrophotometrically using the Trolox equivalent antioxidant capacity assay⁽⁵⁾.

Ketchup...	SL1	SL2	SL3	SR1	SR2	SR3	SR4	SR5	SP1	M1	M2	M3	M4	O1
Lycopene*	60	128	179	160	176	189	192	213	242	78	139	186	212	192
β -carotene*	4.6	2.4	5.0	7.9	5.9	4.1	5.6	4.6	8.2	3.2	4.8	3.5	8.3	5.5
Tomato content [†]	103	97	115	156	181	172	172	140	103	106	126	153	ND	ND
AA [‡]	0.45	0.47	0.73	0.67	0.79	0.61	0.75	0.74	1.04	0.41	0.72	0.68	1.03	0.93

SL, supermarket low-price product; SR, supermarket regular-price product; SP, supermarket premium-price product; M, manufacturer's product; O, organic product; ND, no data available.*Values ($\mu\text{g/g}$) are means for four determinations. [†] $\mu\text{g}/100\text{g}$ finished product. [‡]Values (mmol Trolox equivalents/l) are means for three determinations.

A 4-fold variation in lycopene content was observed, with the highest level measured in a supermarket premium product (SP1) and the lowest level measured in a supermarket low-price product (SL1). For β -carotene a manufacturer's own brand contained the highest level with the lowest level observed for a supermarket low-price product (SL2). For AA the SP1 ketchup contained the highest activity whereas a manufacturer's own brand ketchup (M1) possessed the lowest. Both lycopene and β -carotene content correlated with AA (r 0.845 and 0.769 respectively, $P < 0.001$). Significant correlations were also observed between tomato content and carotenoid concentrations (r 0.749 and 0.608 for lycopene and β -carotene respectively). These results are consistent with data from other studies^(3,6) and taken together with information on ketchup intake indicate that ketchup consumption could contribute to between 8 and 38% of UK lycopene intake.

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