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Total antioxidant capacity of 10 commercially available tomato juices before and after *in vitro* digestion

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Advances in public health nutrition rely on the accurate quantification of biologically active constituents of commonly consumed food products. Antioxidants are one particular group of food constituents which are regularly quantified due to their proposed health benefits. Epidemiological studies have shown a reduction in the incidence of disease states such as CVD and cancers when greater amounts of naturally occurring antioxidants are consumed⁽¹⁾. Tomatoes and tomato products have received considerable scientific attention, primarily because they are the major dietary source of the potent antioxidant lycopene and a good source of a variety of other antioxidant carotenoids. Carotenoid bioavailability is increased when tomatoes are processed and therefore, tomato juices may be an excellent source of bioavailable antioxidants⁽²⁾. In addition to quantifying the total antioxidant capacity (TAC) of produce, it is important to know whether these antioxidants are biologically available after digestion. Therefore, the objective of the present study was to evaluate the TAC of 10 commercially available tomato juices, both value and premium brands, before and after the gastric and duodenal phases of an *in vitro* digestion. Samples of each juice were subjected to an *in vitro* digestion procedure involving simulated gastric and duodenal phases. Samples were analysed for TAC before and after the gastric phase, and after the duodenal phase of digestion, using both the ferric ion reducing antioxidant power (FRAP) assay⁽³⁾ and the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay⁽⁴⁾.

Juice	FRAP ($\mu\text{mol/l}$)						DPPH % inhibition		DDPH (fold change)	
	Before	SE	Gastric	SE	Duodenal	SE	Before	SE	Gas	Duo
1	1971	21	3668*	298	3687*	291	79.9	1.1	1.01	0.71
2	2497	18	3890*	83	3743*	106	88.5	0.2	1.24	0.86
3	1843	15	2841*	71	2637*	106	67.3	0.9	1.02	0.7
4	2750	111	3724*	120	3190*	89	81	0.6	1.13	0.82
5	2905	223	3882*	105	3308*	224	81.8	0.2	1.02	0.67
6	3138	96	5008*	159	3772*	208	85.7	0.1	1.21	0.76
7	2414	88	3172*	87	2959*	126	82.5	0.2	1.26	0.92
8	2683	74	3287*	68	3077*	5	81.2	0.4	1.29	0.84
9	2497	84	3547*	137	3289*	66	83.9	0.4	1.24	0.94
10	2202	39	3417*	87	3111*	51	80.4	0.4	1.15	0.88

n 3 independent experiments; * $P < 0.01$ = significantly different from same sample prior to digestion, SE = standard error, fold change is shown from sample prior to digestion, for the gastric phase (Gas) and duodenal phase (Duo).

The TAC of the analysed tomato juices increased significantly ($P < 0.01$) after both gastric and duodenal phases as measured by the FRAP assay. However, the results of the DPPH assay showed a small increase in TAC after the gastric phase and a small decrease after the duodenal phase. In conclusion, tomato juices show an equivalent or increased TAC following digestion. This study provides the first measurement of tomato juice antioxidants after digestion.

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