



Effects of daily ingestion of chilli on serum oxidation in adult men and women



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Background:

Laboratory studies have shown that the resistance of isolated low density lipoprotein cholesterol or linoleic acid to oxidation is increased in incubations with chilli extracts or capsaicin - the active ingredient of chilli. It is unknown if these *in vitro* antioxidative effects also occur in serum of people eating chilli regularly.

Objective:

To investigate the effect of daily ingestion of chilli on serum oxidation in adult men and women.

Design:

This study investigated the effects of regular consumption of chilli on *in vitro* serum lipoprotein oxidation and total antioxidant status, in healthy adult men and women. In a randomized cross over study, twenty seven participants (13 men and 14 women) ate 30g/day of 'Freshly chopped chilli' blend (55% cayenne chilli) and no chilli (bland) diets, for four weeks each. Use of other spices such as cinnamon, ginger, garlic, mustard was restricted to minimum amounts. At the end of each dietary period serum samples were analysed for lipids, lipoproteins, total antioxidant status (TAS) and copper-induced lipoprotein oxidation. Lag time (before initiation of oxidation), and rate of oxidation (slope of propagation phase) were calculated.

Outcomes:

There was no significant difference in the serum lipids, lipoproteins and TAS at the end of the two dietary periods (Table 1). In the whole group, the rate of oxidation was significantly lower (mean difference MD -0.23 A/min(10^{-3}); $p = 0.04$) after the chilli diet, compared to the bland diet. In women, lag time was higher (MD 9.6 min; $p < 0.001$) after the chilli diet, compared to the bland diet (Table 2). The longer lag phase in women, but not in men, after four weeks of regular chilli consumption may have been due to the higher amount of chilli/capsaicin available per kg body weight.

Conclusion:

Regular consumption of chilli for four weeks increases the resistance of serum lipoproteins to oxidation.

Table 1. Serum lipids, lipoproteins, parameters of serum oxidation and TAS at the end of the bland and the chilli diet

Variable (Units)	Mean (95%CI)	MD (95%CI)	p
Total cholesterol (mmol/L)			
Bland	5.75 (5.39 to 6.10)		
Chilli	5.67 (5.27 to 6.10)	-0.06 (-0.26 to 0.14)	0.56
Low density lipoprotein (mmol/L)			
Bland	3.94 (3.64 to 4.25)		
Chilli	3.87 (3.54 to 4.19)	-0.07 (-0.23 to 0.85)	0.37
High density lipoprotein (mmol/L)			
Bland	1.42 (1.24 to 1.61)		
Chilli	1.42 (1.22 to 1.61)	-0.002 (-0.06 to 0.05)	0.93
Triglycerides (mmol/L)			
Bland	1.70 (1.25 to 2.16)		
Chilli	1.75 (1.26 to 2.27)	0.05 (-0.13 to 0.25)	0.33
Lag Time (min)			
Bland	68.7 (60.3 to 77.1)		
Chilli	71.8 (64.3 to 79.3)	2.6 (-3.6 to 8.7)	0.41
Rate of oxidation A/min(10^{-3})			
Bland	2.5 (2.2 to 2.7)		
Chilli	2.2 (2.0 to 2.5)	-0.2 (-0.4 to -0.0)	0.04*
Total antioxidant status (mmol/L)			
Bland	1.0 (0.9 to 1.1)		
Chilli	1.1 (1.0 to 1.2)	0.0 (-0.0 to 0.1)	0.28

n = 27; MD - mean difference after adjusting for order and period effect of diets; CI - confidence interval; A-absorbance; * significantly different from the bland diet

Table 2. Body weight and parameters of serum lipoprotein oxidation at end of the bland and the chilli diet, by gender

Variable	Men (n = 13)		Women (n = 14)	
	Mean (95%CI)	p	Mean (95%CI)	p
Weight (kg)#				
Bland	85.4 (76.8 to 94.0)		68.9 (60.0 to 77.9)	
Chilli	85.6 (76.8 to 94.4)	0.31	69.2 (60.3 to 78.0)	0.20
Lag Time (min)				
Bland	74.4 (60.1 to 88.7)		63.4 (53.1 to 73.8)	
Chilli	71.5 (57.8 to 85.3)	0.57	72.1 (63.1 to 81.1)	<0.001*
Rate of oxidation A/min(10^{-3})				
Bland	2.6 (2.1 to 3.1)		2.3 (2.0 to 2.7)	
Chilli	2.3 (1.9 to 2.7)	0.05	2.2 (1.9 to 2.5)	0.21

CI - confidence interval; A-absorbance; * significantly different from the bland diet; # significantly different between men and women