

Table 1 Polyphenol composition of the cocoa extract (1.4g) used in the study

Component	Value
Theobromine (mg) ²	140.42 (7.02)
Total polyphenols as catechin (mg) ¹	645.30 (32.27)
Total flavanols as catechin (mg) ²	414.26 (20.71)
- Epicatechin (mg) ²	153.44 (7.67)
- Catechin (mg) ²	14.56 (0.73)
- Dimer B2 (mg) ²	99.40 (4.97)
- Dimer B1 (mg) ²	13.44 (0.67)
- Oligomeric procyanidins ²	133.53 (6.68)

¹Determined by the Folin-Ciocalteu reagent (colorimetric assay)

²Determined by HPLC (High-performance liquid chromatography) assay (chromatographic technique)

Table 2

Variables	Cocoa group (n=24)		Control group (n=23)		Δp	Changes in blood biochemical parameters in both intervention groups (control and cocoa)
	Baseline	4 week	Baseline	4 week		
<i>Anthropometric, body composition and blood pressure</i>						
Weight (kg)	81.51 (11.41)	79.03 (11.36)***	83.25 (10.45)	80.63 (10.15)***	0.700	
Waist (cm)	102.58 (8.72)	98.28 (8.99)***	105.54 (7.18)	100.37 (7.69)***	0.482	
Total fat mass (%)	40.50 (6.61)	39.22 (6.61)***	41.80 (7.76)	40.30 (7.71)***	0.812	
Truncal fat mass (%)	45.21 (5.69)	43.33 (5.81)***	46.08 (6.60)	44.06 (6.74)***	0.725	
Lean mass (%)	57.42 (6.55)	58.62 (6.40)***	56.21 (7.41)	57.58 (7.30)***	0.583	
SBP (mmHg)	116 (13.02)	108 (10.81)***	123 (14.29)	116 (15.12)***	0.477	
DBP (mmHg)	79 (8.24)	71 (6.96)***	82 (8.45)	77 (8.51)***	0.302	
<i>Blood biochemical parameters</i>						
Glucose (mg/dL)	98.35 (9.99)	95.67 (9.48)	98.85 (10.03)	96.73 (10.96)	0.868	
Insulin (μ U/mL)	6.51 (3.08 ; 11.10)	4.93 (2.24 ; 7.21)**	6.19 (3.83 ; 9.45)	3.9 (1.25 ; 5.89)***	0.941	
Total-c (mg/dL)	234 (217.25 ; 259.50)	194.5 (171 ; 212.5)***	252 (221 ; 285)	213 (185 ; 235)***	0.509	
LDL-c (mg/dL)	162.09 (32.27)	130.40 (25.45)***	179.18 (50.98)	147.40 (35.31)***	0.992	
HDL-c (mg/dL)	48.92 (39.23 ; 60.48)	43.92 (38.96 ; 50.70)**	45.16 (40.29 ; 57.43)	44.84 (33.18 ; 50.74)*	0.808	
TG (mg/dL)	108 (86 ; 138.75)	80 (63 ; 103)***	103 (79 ; 119)	71 (56 ; 93)**	0.887	
Total proteins (g/L)	70.58 (3.19)	68.11 (2.76)***	71.36 (4.54)	68.78 (3.39)**	0.917	
<i>Biomarkers of oxidative stress and endothelial dysfunction</i>						
oxLDL (U/L)	42.75 (34.95 ; 49.67)	35.82 (28.62 ; 38.41)***	52.62 (42.71 ; 60.36)	36.35 (31.56 ; 45.21)***	0.030	
MPO (μ g/L)	68 (46.26 ; 83.38)	46.88 (37.43 ; 71.13)	83.50 (61.5 ; 100)	43.10 (31.95 ; 53.0)**	0.171	
sVCAM-1 (ng/mL)	681.04 (287.63)	729.48 (232.18)	655.22 (177.04)	699.48 (215.60)	0.955	
sICAM-1 (ng/mL)	252.42 (68.65)	232.92 (57.30)***	254.33 (48.92)	236.05 (44.01)**	0.874	

Data are expressed as mean (SD) for normally distributed variables or as median and interquartile range for non-normally distributed. Comparisons between baseline and end of the study were analysed by paired student t-test or Wilcoxon test (*** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$). Comparisons between both groups were performed with an independent t-test or U Mann-Whitney test (Δp). $n=23$ in sVCAM-1 control group and $n=22$ in sICAM-1 cocoa group. Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; Total-c, total cholesterol; LDL-c, low-density lipoprotein-cholesterol; HDL-c, high-density lipoprotein-cholesterol; TG, triglycerides; oxLDL, oxidized low-density lipoprotein-cholesterol; MPO, myeloperoxidase; sVCAM-1, soluble vascular cell adhesion molecule-1; sICAM-1, soluble intercellular cell adhesion molecule-1; Δp (final-initial)

Table 3 Multiple regression analyses to assess the effect of cocoa extract supplementation on % Δ oxLDL as dependent variable, divided by sex

		% Δ oxLDL				
		B	95% CI	p	R ²	p model
Men (n=22)						
	Unadjusted	- 0.100	- 0.240 ; 0.040	0.154	0.054	0.154
	Model 1	- 0.100	- 0.227 ; 0.028	0.119	0.196	0.049
	Model 2	- 0.108	- 0.209 ; - 0.008	0.036	0.503	0.001
	Model 3	-0.123	- 0.226; - 0.020	0.022	0.484	0.001
Women (n=25)						
	Unadjusted	-0.007	-0.158; 0.144	0.924	-0.043	0.924
	Model 1	-0.006	-0.161;0.148	0.932	-0.088	0.970
	Model 2	-0.008	-0.164;0.147	0.912	-0.089	0.981
	Model 3	-0.008	-0.163; 0.147	0.913	-0.089	0.978

Model 1: Adjusted for % Δ weight (kg)

Model 2: Adjusted for % Δ total cholesterol (mg/dL)

Model 3: Adjusted for % Δ LDL-c (mg/dL)