

Supplementary Materials

Figure S1. Selection of study subjects and study flow.

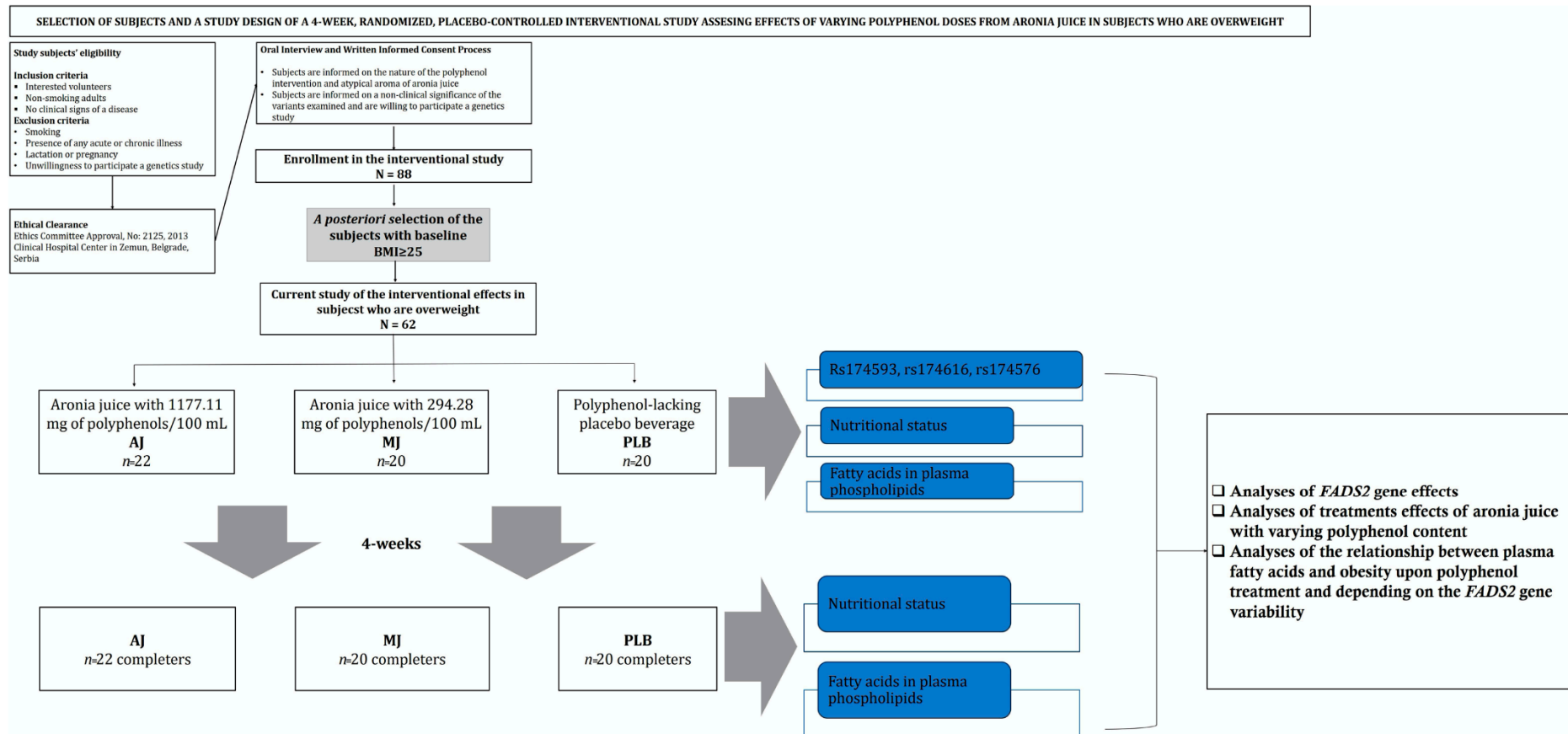


Table S1. Baseline daily dietary intake of study subjects who are overweight (BMI \geq 25) across the study intervention groups with varying polyphenol intake.

	Total <i>n</i> = 62	AJ <i>n</i> =22	MJ <i>n</i> =20	PLB <i>n</i> =20
Carbohydrates, g	221.34 \pm 8.75	222.79 \pm 12.45	204.95 \pm 12.74	236.07 \pm 19.84
Protein, g	80.82 \pm 2.84	82.29 \pm 4.64	80.09 \pm 4.28	79.87 \pm 5.99
Fat, g	83.60 [68.54, 113.59]	82.61 [70.16, 113.94]	83.02 [72.71, 100.75]	94.98 [57.40, 120.09]
SFA, g	28.75 \pm 1.44	29.41 \pm 2.63	29.76 \pm 2.31	26.98 \pm 2.57
MUFA, g	24.89 [22.10, 35.44]	25.37 [21.76, 36.06]	24.45 [22.81, 32.62]	23.18 [19.20, 44.63]
PUFA, g	22.67 [16.47, 31.15]	21.08 [15.95, 31.29]	24.55 [19.47, 28.90]	26.12 [14.45, 38.68]
C12:0, g	0.84 [0.51, 1.19]	1.04 [0.50, 1.55]	0.88 [0.49, 1.10]	0.67 [0.51, 1.09]
C14:0, g	2.04 [1.44, 3.03]	2.29 [1.42, 3.07]	2.29 [1.49, 3.59]	1.72 [1.24, 2.82]
C16:0, g	14.40 \pm 0.70	14.78 \pm 1.21	14.60 \pm 1.14	13.74 \pm 1.32
C18:0, g	6.65 [4.61, 8.58]	6.31 [4.50, 9.05]	6.57 [5.48, 8.17]	7.14 [3.22, 9.71]
C18:1n-9, g	20.74 [17.03, 27.26]	21.11 [17.34, 27.72]	20.12 [17.19, 24.02]	19.41 [14.69, 34.72]
C18:2n-6, g	17.96 [14.85, 23.98]	17.10 [13.60, 24.61]	19.64 [17.19, 22.97]	16.49 [12.62, 26.52]
C18:3n-3, g	0.70 [0.50, 1.24]	0.66 [0.50, 1.24]	0.73 [0.49, 1.34]	0.76 [0.47, 1.28]
C20:4n-6, g	0.15 [0.10, 0.20]	0.17 [0.11, 0.23]	0.14 [0.09, 0.20]	0.12 [0.10, 0.21]
C20:5n-3, g	0.04 [0.01, 0.14]	0.07 [0.02, 0.23]	0.04 [0.01, 0.24]	0.03 [0.01, 0.10]
C22:6n-3, g	0.18 [0.10, 0.43]	0.20 [0.09, 0.39]	0.14 [0.10, 0.43]	0.18 [0.08, 0.46]
Total polyphenols, mg	952.05 \pm 44.73	959.66 \pm 64.42	966.70 \pm 87.88	928.58 \pm 85.63

Data are presented as Mean \pm SEM or Median [25th, 75th percentile] depending on a distribution. Variance in distribution of the parameters was evaluated by the general linear model and Kruskal-Wallis analyses, for parametric and non-parametric approach, respectively; testing differences between parameter distributions across the study treatments with varying polyphenol content ($p > 0.05$ for all parameters).

AJ, subjects drinking aronia juice with 1177.11 mg of polyphenols per 100 mL; MJ, subjects drinking aronia juice with 294.28 mg of polyphenols per 100 mL; PLB, subjects drinking polyphenol-lacking placebo beverage. SFA, Total saturated fatty acid; MUFA, Total monounsaturated fatty acid; PUFA, Total polyunsaturated fatty acid; C12:0, Lauric acid; C14:0, Myristic acid; C16:0, Palmitic acid; C18:0, Stearic acid; C18:1 n-9, Oleic acid; C18:2 n-6, Linoleic acid; C18:3 n-3, α -Linolenic acid; C20:4 n-6, Arachidonic acid; C20:5 n-3, Eicosapentaenoic acid; C22:6 n-3, Docosahexaenoic acid.

Table S2. Baseline levels of individual fatty acids in plasma phospholipids of subjects who are overweight (BMI \geq 25) across the study intervention groups with varying polyphenol intake.

	Total <i>n</i> = 62	AJ <i>n</i> =22	MJ <i>n</i> =20	PLB <i>n</i> =20
Palmitic, C16:0	30.39 \pm 0.28	30.08 \pm 0.58	30.17 \pm 0.40	31.02 \pm 0.38
Palmitoleic, C16:1n-7	0.59 \pm 0.03	0.55 \pm 0.04	0.61 \pm 0.06	0.60 \pm 0.05
Stearic, C18:0	16.88 \pm 0.19	17.22 \pm 0.32	16.38 \pm 0.36	17.00 \pm 0.28
Oleic, C18:1n-9	7.80 \pm 0.12	7.68 \pm 0.17	7.83 \pm 0.25	7.90 \pm 0.22
Vaccenic, C18:1n-7	2.36 [2.10, 2.73]	2.60 [2.17, 2.75]	2.24 [2.06, 2.89]	2.16 [1.99, 2.54]
Linoleic, C18:2n-6	23.89 \pm 0.42	23.66 \pm 0.75	24.69 \pm 0.74	23.31 \pm 0.64
DGLA, C20:3n-6	3.09 \pm 0.11	3.11 \pm 0.22	3.00 \pm 0.19	3.18 \pm 0.18
Arachidonic, C20:4n-6	10.89 \pm 0.27	11.25 \pm 0.49	11.06 \pm 0.35	10.26 \pm 0.51
EPA, C20:5n-3	0.30 [0.22, 0.42]	0.29 [0.22, 0.41]	0.33 [0.18, 0.43]	0.34 [0.23, 0.44]
Adrenic, C22:4n-6	0.41 [0.35, 0.51]	0.41 [0.35, 0.54]	0.46 [0.35, 0.55]	0.40 [0.31, 0.45]
Clupanodonic, C22:5n-3	0.56 \pm 0.02	0.55 \pm 0.02	0.53 \pm 0.03	0.59 \pm 0.05
DHA, C22:6n-3	2.79 \pm 0.11	2.79 \pm 0.18	2.51 \pm 0.17	3.07 \pm 0.23
D5D, AA/DGLA	3.59 [2.97, 4.83]	3.86 [2.82, 4.85]	3.59 [3.03, 5.21]	3.08 [2.84, 4.17]
D6D, DGLA/LA	0.13 \pm 0.01	0.14 \pm 0.01	0.13 \pm 0.01	0.14 \pm 0.01
AA/EPA	35.09 [26.18, 48.68]	36.74 [28.69, 53.13]	35.09 [26.87, 57.43]	29.90 [19.57, 40.34]
AA/DHA	4.08 [3.28, 4.98]	4.16 [3.32, 4.86]	4.42 [3.48, 6.35]	3.50 [2.52, 4.48]

Data are presented as Mean \pm SEM or Median [25th, 75th percentile] depending on a distribution. Variance in distribution of the parameters was evaluated by the general linear model and Kruskal-Wallis analyses, for parametric and non-parametric approach, respectively; testing differences between parameter distributions across the study treatments with varying polyphenol content ($p > 0.05$ for all parameters).

AJ, subjects drinking aronia juice with 1177.11 mg of polyphenols per 100 mL; MJ, subjects drinking aronia juice with 294.28 mg of polyphenols per 100 mL; PLB, subjects drinking polyphenol-lacking placebo beverage. AA, Arachidonic acid; DGLA, Dihomo- γ -linolenic acid; EPA, Eicosapentaenoic acid; DHA, Docosahexaenoic acid; D5D and D6D, predicted desaturase-5 and -6 enzymatic activities, respectively.

Table S3. Allele and genotype distribution of the *FADS2* genetic variants in subjects who are overweight.

	Chromosome Position	Reference allele homozygote <i>n</i> (%)	Heterozygote <i>n</i> (%)	Variant allele homozygote <i>n</i> (%)	Variant Allele Frequency Our Study/1000Genome	Chi-sq^a	p-value^b
rs174593, T>C	11:61851359	TT 27 (43.5)	TC 30 (48.4)	CC 5 (8.1)	0.32/0.21	1.14	0.286
rs174616, G>A	11:61861650	GG 14 (22.6)	GA 36 (58.1)	AA 12 (19.4)	0.48/0.48	2.63	0.105
rs174576, C>A	11:61836038	CC 23 (37.1)	CA 33 (53.2)	AA 6 (9.7)	0.36/0.36	2.26	0.133

^ap value is associated with Chi-sq. ^bChi-sq associated with test of compliance with Hardy-Weinberg equilibrium of balanced distribution of genotypes

Table S4. Distribution of 4-week changes (Δ) in body weight, BMI and long-chain polyunsaturated fatty acids in plasma phospholipids, respective of variant allele presence in the three *FADS2* variant places and regardless of treatment type.

	rs174593		174616		174576	
	Major homozygotes	Variant allele carriers	Major homozygotes	Variant allele carriers	Major homozygotes	Variant allele carriers
Δ BMI	-0.16 \pm 0.09	-0.12 \pm 0.07	-0.09 \pm 0.08	-0.15 \pm 0.07	-0.21 \pm 0.11	-0.10 \pm 0.06
Δ Body Weight	-0.40 [-1.20, 0.40]	-0.20 [-1.03, 0.43]	-0.40 [-0.95, 0.25]	-0.20 [-1.20, 0.50]	-0.20 [-1.30, 0.40]	-0.25 [-0.93, 0.43]
Δ Linoleic, C18:2 n-6	-0.85 \pm 0.58	-1.43 \pm 0.42	0.47\pm0.89	-1.55\pm0.36	-0.33\pm0.54	-1.72\pm0.44
Δ Arachidonic, C20:4 n-6	-1.12 [-2.19, 0.23]	-0.33 [-1.54, 0.60]	0.15 [-1.13, 0.78]	-1.10 [-1.82, 0.25]	-0.45 [-2.40, 0.54]	-1.10 [-1.65, 0.25]
Δ Adrenic, C22:4 n-6	-0.08 [-0.16, 0.03]	-0.07 [-0.17, 0.09]	0.00 [-0.17, 0.04]	-0.08 [-0.16, 0.04]	-0.07 [-0.13, 0.03]	-0.08 [-0.16, 0.09]
Δ EPA, C20:5 n-3	0.09 [-0.05, 0.29]	0.12 [-0.11, 0.36]	0.09 [0.02, 0.38]	0.10 [-0.10, 0.29]	0.09 [-0.10, 0.26]	0.10 [-0.07, 0.39]
Δ Clupanodonic C22:5 n-3	-0.07 [-0.16, 0.04]	0.02 [-0.14, 0.13]	-0.07 [-0.23, 0.06]	-0.05 [-0.14, 0.11]	-0.07 [-0.16, 0.06]	-0.05 [-0.14, 0.13]
Δ DHA, C22:6 n-3	0.04 [-0.45, 0.62]	0.12 [-0.32, 0.84]	0.22 [-0.60, 0.89]	0.10 [-0.29, 0.75]	-0.04 [-0.52, 0.44]	0.27 [-0.21, 0.87]
Δ D5D, AA/DGLA	0.14 [-0.13, 1.03]	-0.10 [-0.46, 0.45]	0.36 [-0.09, 1.02]	-0.01 [-0.47, 0.71]	0.36 [-0.10, 1.13]	-0.10 [-0.46, 0.30]
Δ D6D, DGLA/LA	-0.01 [-0.03, 0.01]	0.00 [-0.02, 0.02]	0.00 [-0.02, 0.01]	0.00 [-0.02, 0.02]	-0.02 [-0.05, 0.01]	0.01 [-0.01, 0.02]
Δ AA/EPA	-9.74 [-24.86, 2.17]	-5.16 [-26.97, 3.77]	-8.56 [-16.73, 0.26]	-8.13 [-27.02, 3.99]	-7.88 [-24.92, 6.94]	-8.56 [-26.79, 2.96]
Δ AA/DHA	-0.28 [-1.15, 0.25]	-0.26 [-0.95, 0.46]	-0.17 [-1.10, 0.75]	-0.28 [-0.99, 0.19]	0.05 [-0.77, 0.75]	-0.35 [-1.20, 0.08]

Data are presented as Mean \pm SEM or Median [25th, 75th percentile] depending on a distribution. Variance in distribution of the parameters was evaluated by the general linear model and Kruskal-Wallis analyses, for parametric and non-parametric approach, respectively; testing differences between parameter distributions across *FADS2* genotype distributions. Bolded text denotes significantly different distribution of a parameter across genotypes. EPA, Eicosapentaenoic acid; DHA, Docosahexaenoic acid; D5D and D6D, predicted desaturase-5 and -6 enzymatic activities, respectively; DGLA, Dihomo- γ -linolenic acid; AA, Arachidonic acid.

Table S5. Associations between *FADS2* variants (rs174593, rs174616, rs174576) and changes in BMI and total body weight in subjects who are overweight (BMI \geq 25), across the study intervention groups with varying polyphenol intake.

		rs174593			rs174616			rs174576		
		ΔR^2	B \pm S.E.	<i>p</i>	ΔR^2	B \pm S.E.	<i>p</i>	ΔR^2	B \pm S.E.	<i>p</i>
Δ BMI										
M1	TS	0.000	0.01 \pm 0.09	0.890	0.006	-0.05 \pm 0.08	0.541	0.016	0.09 \pm 0.0	0.329
M2		0.041	0.02 \pm 0.09	0.835	0.038	-0.04 \pm 0.09	0.638	0.053	0.12 \pm 0.0	0.193
M1	AJ	0.001	-0.03 \pm 0.20	0.871	0.021	-0.09 \pm 0.15	0.522	0.018	0.10 \pm 0.1	0.555
M2		0.182	0.07 \pm 0.20	0.738	0.159	0.03 \pm 0.16	0.840	0.265	0.27 \pm 0.1	0.122
M1	MJ	0.096	0.22 \pm 0.17	0.197	0.033	0.14 \pm 0.18	0.456	0.02	0.10 \pm 0.1	0.566
M2		0.155	0.25 \pm 0.17	0.155	0.141	0.14 \pm 0.18	0.434	0.185	0.20 \pm 0.1	0.283
M1	PLB	0.102	-0.18 \pm 0.13	0.181	0.074	-0.15 \pm 0.13	0.260	0.004	0.04 \pm 0.1	0.789
M2		0.04	-0.20 \pm 0.14	0.184	0.038	-0.17 \pm 0.15	0.263	0.035	0.05 \pm 0.1	0.749
Δ Body Weight										
M1	TS	0.000	0.04 \pm 0.27	0.879	0.006	-0.16 \pm 0.26	0.545	0.019	0.29 \pm 0.2	0.288
M2		0.047	0.06 \pm 0.28	0.834	0.044	-0.12 \pm 0.26	0.645	0.061	0.39 \pm 0.2	0.159
M1	AJ	0.004	-0.19 \pm 0.66	0.774	0.019	-0.30 \pm 0.48	0.541	0.024	0.40 \pm 0.5	0.491
M2		0.191	0.16 \pm 0.65	0.805	0.176	0.13 \pm 0.51	0.797	0.292	0.99 \pm 0.5	0.088
M1	MJ	0.105	0.68 \pm 0.48	0.175	0.034	0.40 \pm 0.52	0.449	0.020	0.30 \pm 0.5	0.564
M2		0.141	0.73 \pm 0.48	0.152	0.134	0.41 \pm 0.51	0.431	0.180	0.59 \pm 0.5	0.275
M1	PLB	0.099	-0.53 \pm 0.39	0.190	0.071	-0.45 \pm 0.39	0.269	0.003	0.09 \pm 0.4	0.823
M2		0.041	-0.60 \pm 0.43	0.189	0.039	-0.52 \pm 0.45	0.266	0.033	0.12 \pm 0.4	0.793

M1, Crude regression model; M2, further adjusted for gender and habitual n-6/n-3 intake. TS, Total study sample; AJ, subjects drinking aronia juice with 1177.11 mg of polyphenols (gallic acid equivalents, GAE) per 100 mL; MJ, subjects drinking aronia juice with 294.28 mg of polyphenols (GAE) per 100 mL; PLB, subjects drinking polyphenol-lacking placebo beverage. *p*, probability values associated with unstandardized coefficients (B) upon multivariate-adjusted, hierarchical linear regression.