Almond Consumption as a Dietary Strategy for Improving Vascular Function and Hemodynamics in Middle-Aged Adults with Overweight or Obesity

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Background

Overweight and obesity are significant contributors to cardiovascular disease, often leading to impaired vascular function and elevated blood pressure. Individuals with excess weight commonly experience reduced endothelial function, increased arterial stiffness, and compromised vascular responsiveness. Almonds, rich in nutrients such as monounsaturated fats, vitamin E, magnesium, fiber, and polyphenols, may offer a promising dietary intervention to improve vascular health in this population.

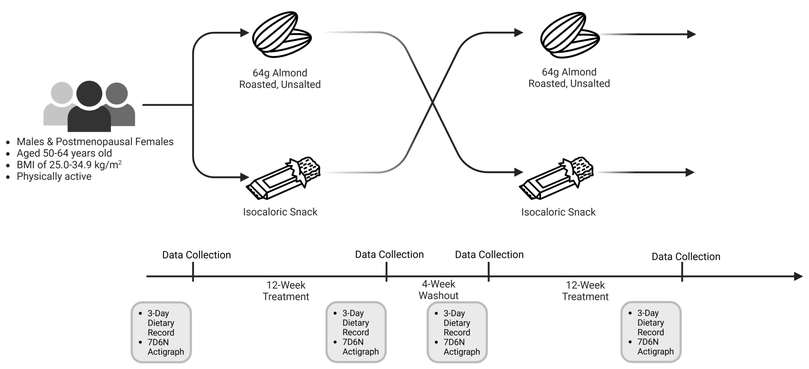
Aims of the Research

1: Evaluate the effects of almond consumption on vascular function markers, including flow-mediated dilation (FMD), pulse wave analysis (PWA), and pulse wave velocity (PWV).

2: Assess the impact of almond intake on blood pressure parameters.

3: Explore potential mechanisms by which almonds may improve vascular health, focusing on reductions in inflammation and oxidative stress that affect endothelial function.

Research Design/Methods



Results

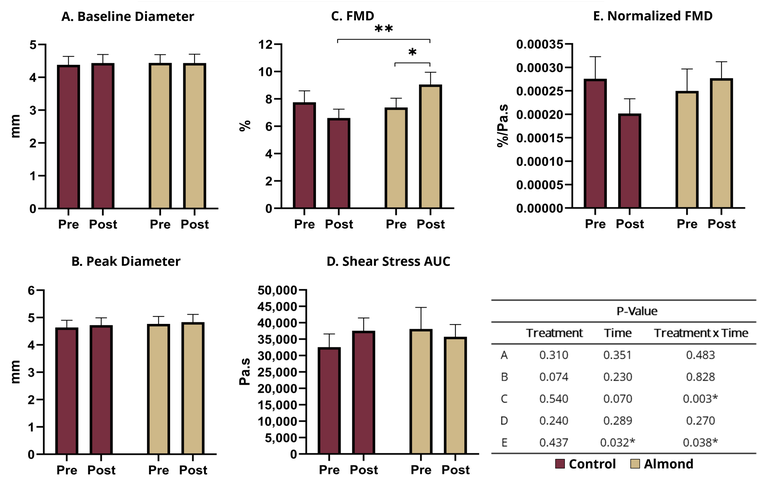
Participants' Characteristics at Baseline and Adherence Rate

Characteristic	Treatment (Mean ± SD) Control	Almond
Age (Years)	58.0 ± 1.7	
Sex (n)	Male = 17, Female = 21	
Height (m)	1.68 ± 0.10	
Weight (kg)	82.7 ± 13.3	82.8 ± 12.4
BMI (kg/m²)	29.0 ± 3.4	29.0 ± 3.4
Total Body Fat (%)	31.8 ± 6.3	30.9 ± 8.8
PAL (Daily Step Counts)	10,490 ± 4,706	10,864 ± 4384
Energy Intake (kcal)	1886 ± 631	1858 ± 526
Adherence Rate (%)	89.2 ± 12.3	89.8 ± 9.4

BMI = body mass index, PAL = Physical Activity Level

* Denotes P-values < 0.05.

Effects of Almond Intake for 12 Weeks on Endothelial Function



	P-Value		
	Treatment	Time	Treatment x Time
A	0.310	0.351	0.483
B	0.074	0.230	0.828
C	0.540	0.070	0.003*
D	0.240	0.289	0.270
E	0.437	0.032*	0.038*

Control Almond

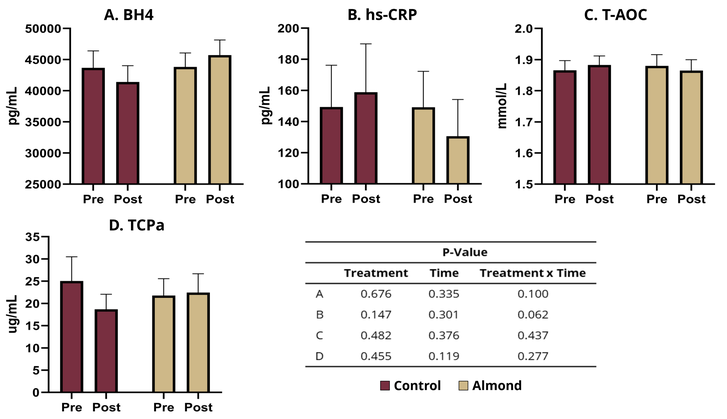
Effects of Almond Intake for 12 Weeks on Arterial Stiffness and Blood Pressure

	Treatment (Mean ± SD) Control		Almond	
	Baseline	12-Week	Baseline	12-Week
AIx (%)	86.4 ± 12.0	91.6 ± 28.5	93.6 ± 23.5	90.1 ± 15.5
AIx @ HR75 (%)	21.3 ± 7.8	23.0 ± 10.6	22.9 ± 10.2	23.1 ± 8.6
Right ba-PWV	13.8 ± 2.0	13.9 ± 2.3	13.9 ± 2.4	13.9 ± 2.5
Left ba-PWV	13.5 ± 2.2	13.7 ± 2.2	13.6 ± 2.3	13.4 ± 2.3
SBP	127 ± 15	126 ± 16	127 ± 16	122 ± 18
DBP	77 ± 10	77 ± 9	78 ± 9	76 ± 11
MAP	94 ± 11	93 ± 11	94 ± 11	92 ± 13

AIx = Augmentation Index, AIx @ HR75 = Augmentation Index at Heart Rate 75 bpm, ba-PWV = Brachial Ankle Pulse Wave Velocity, SBP = Systolic Blood Pressure, DBP = Diastolic Blood Pressure, MAP = Mean Arterial Pressure

* Denotes significant treatment x time effect ($p < 0.05$).

Effects of Almond Intake for 12 Weeks on the Biomarkers of Inflammation and Oxidative Stress



	P-Value		
	Treatment	Time	Treatment x Time
A	0.676	0.335	0.100
B	0.147	0.301	0.062
C	0.482	0.376	0.437
D	0.455	0.119	0.277

Control Almond

Conclusion

Replacing a sugar-rich snack with almonds for 12 weeks notably improved endothelial function and contributed to a modest but potentially meaningful reduction in systolic blood pressure in middle-aged adults with overweight or obesity. Although no significant changes were observed in inflammation or oxidative stress biomarkers, the near-significant trend in lowering hs-CRP warrants further investigation in larger or longer-term studies. These findings underscore the potential cardiometabolic benefits of including almonds as part of a balanced diet, particularly in populations with elevated cardiovascular risk.

Key References

Koenen M, Hill MA, Cohen P, Sowers JR. Obesity, Adipose Tissue and Vascular Dysfunction. Circ Res. 2021;128(7):951-968.

Dikariyanto V, Smith L, Francis L, et al. Snacking on whole almonds for 6 weeks improves endothelial function and lowers LDL cholesterol but does not affect liver fat and other cardiometabolic risk factors in healthy adults: the ATTIS study, a randomized controlled trial. Am J Clin Nutr. 2020;111(6):1178-1189.