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The use of systemic anti-hypertensive medications affects optic nerve head structural parameters in healthy and glaucoma subjects

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Abstract

Purpose : To investigate the effects of anti-hypertensive medications on ocular structure in patients with open-angle glaucoma (OAG) and healthy controls.

Methods : 124 OAG patients and 132 non-glaucomatous controls with and without systemic anti-hypertensive medications were categorized into blood pressure (BP) levels based on the American College of Cardiology and American Heart Association guidelines. Categories of systolic BP (SBP) and diastolic BP (DBP) were classified as normal (SBP<120 and DBP<80), elevated (SBP=120–129 and DBP<80), stage 1 hypertension (SBP=130–139 or DBP=80-89), and stage 2 hypertension (SBP≥140 or DBP≥90). Optic nerve head (ONH) parameters, retinal nerve fiber layer (RNFL), and macular thickness were assessed via optical coherence tomography angiography (OCTA, Optovue). Analysis of covariance (ANCOVA) tested strength of interactions among BP category, antihypertensive medication, and study group (OAG/healthy) on structural biomarkers, adjusted for age.

Results : Differences in ONH structural parameters between patients with OAG and controls were significantly reduced in subjects taking anti-hypertensive treatment. Specifically for the same BP category, differences between OAG patients and controls were significantly reduced in healthy subjects receiving anti-hypertensive medications compared to those not receiving treatment (p-value for all interactions:<0.01, Table 1). Use of systemic anti-hypertensive medications did not significantly alter differences in RNFL and macular thickness between patients with OAG and controls within the same BP category (all p>0.05).

Conclusions : In this analysis, use of systemic anti-hypertensive medications reduces differences in OCTA-assessed ONH structural biomarkers between non-glaucomatous controls and patients with OAG.

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Blood pressure category	Healthy subjects	Open-angle glaucoma patients	p-value interaction glaucoma status-use of systemic anti-hypertensive medications
Cup-to-disc area ratio			
Normal BP *without anti-hypertensive treatment (n=45, 19)*	0.280	0.550	p=0.0194
Normal BP *with anti-hypertensive treatment (n=5, 7)*	0.407	0.582	
Elevated BP *without anti-hypertensive treatment (n=12, 16)*	0.334	0.558	
Elevated BP *with anti-hypertensive treatment (n=9, 13)*	0.382	0.613	
Stage 1 hypertension *without anti-hypertensive treatment (n=32, 22)*	0.293	0.636	
Stage 1 hypertension *with anti-hypertensive treatment (n=11, 22)*	0.418	0.573	
Stage 2 hypertension *without anti-hypertensive treatment (n=7, 8)*	0.276	0.523	
Stage 2 hypertension *with anti-hypertensive treatment (n=4, 16)*	0.450	0.513	
Cup-to-disc vertical ratio			
Normal BP *without anti-hypertensive treatment (n=45, 19)*	0.457	0.732	p=0.0094
Normal BP *with anti-hypertensive treatment (n=5, 7)*	0.548	0.751	
Elevated BP *without anti-hypertensive treatment (n=12, 16)*	0.522	0.735	
Elevated BP *with anti-hypertensive treatment (n=9, 13)*	0.598	0.803	
Stage 1 hypertension *without anti-hypertensive treatment (n=32, 22)*	0.467	0.802	
Stage 1 hypertension *with anti-hypertensive treatment (n=11, 22)*	0.606	0.751	
Stage 2 hypertension *without anti-hypertensive treatment (n=7, 8)*	0.415	0.713	
Stage 2 hypertension *with anti-hypertensive treatment (n=4, 16)*	0.639	0.688	
Normal BP