

EFFECT OF ANTIHYPERTENSIVE DRUGS ON BLOOD PRESSURE DURING EXPOSURE TO COLD. EXPERIMENTAL STUDY IN NORMOTENSIVE AND HYPERTENSIVE SUBJECTS



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Objectives. The aim of the present study was to describe the effects of different types of cold exposures on blood pressure (BP) and heart rate (HR) and to test how these cold-induced effects are modulated by antihypertensive drugs representing different kind of mechanisms of action.

Study design. The tested drugs represented the following antihypertensive drug subgroups: metoprolol from beta-blocking agents, carvedilol from alfa- and beta-blocking agents, lisinopril from angiotensin converting enzyme inhibitors, eprosartan from angiotensin II antagonists, amlodipine from calcium channel blockers and hydrochlorothiazide from diuretics. The main outcome measures were the levels and changes in systolic (SBP) and diastolic blood pressure (DBP) and HR before, during and after cold exposure.

Methods. The normotensive and mildly hypertensive subjects were exposed either to -15°C for 15 minutes (with winter clothing), 5°C for 45 minutes (minimal clothing) or to a cold pressor test (CPT). Before measurements at -15°C , metoprolol, carvedilol, lisinopril, eprosartan, hydrochlorothiazide or placebo were given for a week in a double-blind and crossover manner. In one test procedure (5°C and CPT) the test subjects ingested amlodipine for three days or were without drug ingestion before the tests in a crossover manner.

Results. Both SBP and DBP were markedly increased by all types of cold exposure. Cold-induced rises of SBP/DBP were higher during the exposure to 5°C and -15°C (19-35/20-24 mmHg) than during CPT (13/16 mmHg). Metoprolol, carvedilol, lisinopril, eprosartan and amlodipine decreased the level of BP during the exposure to 5°C and -15°C compared to placebo or no drug. The antihypertensive drugs, with dosages used in this study, did not affect the cold-induced rise of BP compared to no drug or placebo. HR increased during CPT, but decreased during exposure to 5°C and -15°C. Metoprolol and carvedilol decreased HR during exposure to -15°C compared to placebo.

Conclusions. The present study demonstrates for the first time the effects of antihypertensive drugs on BP in hypertensive subjects exposed to cold similar to normal outdoor exposure in winter. Although the magnitude of the cold-induced rise in BP was not affected by the drugs, the drug-induced decrease in the level of BP kept the peak values in the cold closer to the recommended threshold limit values.

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