Clin Exp Hypertens. 2019;41(4):307-311. doi: 10.1080/10641963.2018.1481419. Epub 2018 Jun 14.

Hydrogen gas improves left ventricular hypertrophy in Dahl rat of salt-sensitive hypertension

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PMID: 29902079 DOI: 10.1080/10641963.2018.1481419

Abstract

Purpose: Hypertension is an important risk factor for death resulting from stroke, myocardial infarction, and end-stage renal failure. Hydrogen (H_2) gas protects against many diseases, including ischemia-reperfusion injury and stroke. The effects of H_2 on hypertension and its related left ventricular (LV) function have not been fully elucidated. The purpose of this study was to investigate the effects of H_2 gas on hypertension and LV hypertrophy using echocardiography.

Methods: Dahl salt-sensitive (DS) rats were randomly divided into three groups: those fed an 8% NaCl diet until 12 weeks of age (8% NaCl group), those additionally treated with 2% H_2 gas (8% NaCl + 2% H_2 group), and control rats maintained on a diet containing 0.3% NaCl until 12 weeks of age (0.3% NaCl group). H_2 gas was supplied through a gas flowmeter and delivered by room air (2% hydrogenated room air, flow rate of 10 L/min) into a cage surrounded by an acrylic chamber. We evaluated interventricular septal wall thickness (IVST), LV posterior wall thickness (LVPWT), and LV mass using echocardiography.

Results: IVST, LVPWT, and LV mass were significantly higher in the 8% NaCl group than the 0.3% NaCl group at 12 weeks of age, whereas they were significantly lower in the 8% NaCl + 2% H_2 group than the 8% NaCl group. There was no significant difference in systolic blood pressure between the two groups.

Conclusion: Our findings suggest that chronic H_2 gas inhalation may help prevent LV hypertrophy in hypertensive DS rats.

Keywords: Salt sensitive hypertension; antioxidant effect; cardiac hypertrophy; hydrogen gas; reactive oxygen species.

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