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COMPARATIVE EVALUATION OF THE ANTIHYPERTENSIVE EFFICACY OF AMLODIPINE AND KC-4 POLYPHENOL IN AN ADRENALINE-INDUCED EXPERIMENTAL HYPERTENSION MODEL

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Annotatsion. This study comparatively evaluated the antihypertensive and vasorelaxant properties of the synthetic compound KC-4 and amlodipine, a standard L-type Ca2+ channel blocker. The pharmacological activity of KC-4 was investigated using complementary in vivo, in silico, and ex vivo approaches. This integrated design makes it possible to characterize, in a connected manner, the compound’s effects on arterial blood pressure in a living organism, its potential molecular targets, and its direct functional efficacy in isolated blood vessels.

Keywords: adrenaline, antihypertensive, aortic blood vessel, polyphenol, verapamil, Ca2+ channel, contraction force.

Introduction. Arterial hypertension (AH) is a major risk factor for cardiovascular diseases, stroke, chronic kidney disease, and heart failure. Genetic predisposition, lifestyle, and environmental factors play important roles in its development [1–3]. The pathogenesis of AH involves increased activity of the renin–angiotensin–aldosterone system (RAAS) and the sympathetic nervous system, endothelial dysfunction, oxidative stress, inflammatory processes, impaired ion-channel function, and vascular remodeling [4]. Studying these mechanisms at the molecular level provides a scientific basis for identifying targets involved in blood-pressure regulation, evaluating the antihypertensive effects of biologically active compounds derived from plants, and developing new effective drugs.

Materials and Methods. The effects of KC-4 and amlodipine on arterial blood pressure were evaluated in white rats using a non-invasive measurement method via the tail artery. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were recorded using an automated tail-cuff system manufactured by Neurobotics. In this method, a pneumatic cuff placed around the tail briefly compresses the artery; as the pressure is gradually reduced, the restoration of blood flow is detected by a pulse sensor [5].

Results and Discussion. To evaluate the antihypertensive efficacy of amlodipine and KC-4, an acute experimental hypertension model was established in rats using adrenaline hydrochloride. Arterial blood pressure was recorded non-invasively in the rats' tail arteries using a Neurobotics device. Based on the results of preliminary screening, amlodipine at 50 mg/kg and the KC-4 polyphenol at 100 mg/kg were administered in the experiments.

In the experimental series evaluating amlodipine, SBP in the control-group rats was 110 ± 3 mmHg, while DBP was 80 ± 3.4 mmHg. Following administration of adrenaline hydrochloride at 10 mg/kg, SBP increased to 145 ± 3.6 mmHg and DBP to 120 ± 4.4 mmHg. Thus, adrenaline increased systolic pressure by 35 mmHg (31.8%) and diastolic pressure by 40 mmHg (50%) compared with the control. These changes indicate that a pronounced hypertensive state was established in the experimental animals (Figure 1).

When amlodipine was administered at 50 mg/kg, the adrenaline-elevated SBP decreased to 105 ± 3.4 mmHg and DBP to 85 ± 2.8 mmHg. Compared with the adrenaline group, systolic pressure decreased by 40 mmHg (27.6%) and diastolic pressure by 35 mmHg (29.2%). Following amlodipine treatment, blood-pressure values approached those of the control group: SBP was 5 mmHg below the control value, while DBP was 5 mmHg above it. This indicates that amlodipine almost completely reversed the acute increase in arterial blood pressure induced by adrenaline (Figure 1).

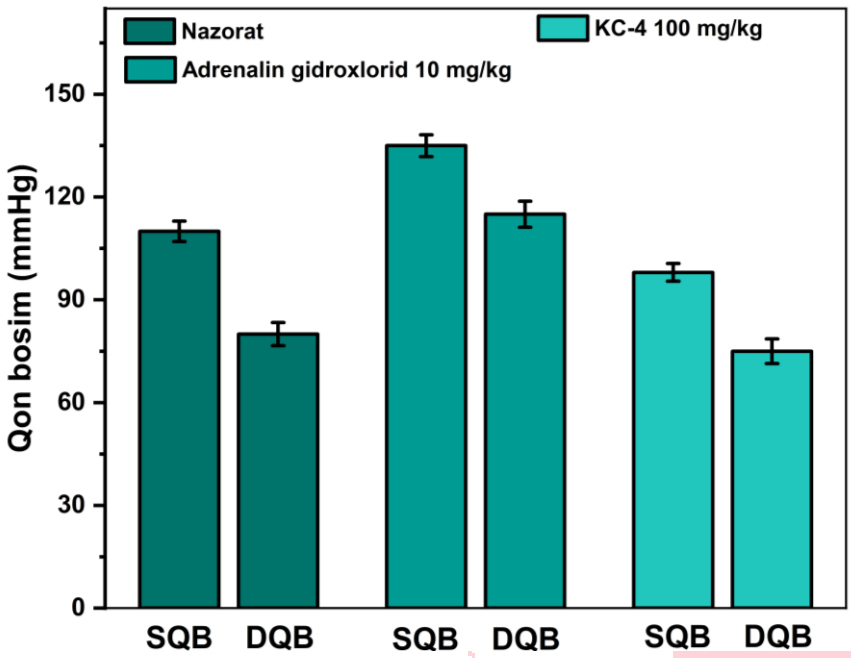


Figure 1. Effect of amlodipine on blood pressure under conditions of adrenaline-induced experimental hypertension. Administration of adrenaline hydrochloride at 10 mg/kg increased systolic and diastolic arterial pressure. Treatment with amlodipine at 50 mg/kg reduced the elevated blood-pressure values toward the control levels. SBP — systolic blood pressure; DBP — diastolic blood pressure. Results are expressed as mean ± error, n = 3–5.

Conclusion. Amlodipine at 50 mg/kg and KC-4 at 100 mg/kg demonstrated pronounced antihypertensive activity under conditions of adrenaline-induced hypertension. Although their efficacy in reducing systolic pressure was similar, KC-4 showed a stronger effect on diastolic arterial pressure.

References

1. Patrick Lacolley, Véronique Regnault, Antonino Nicoletti, Zhenlin Li, Jean-Baptiste Michel. The vascular smooth muscle cell in arterial pathology: a cell that can take on multiple roles // Cardiovascular Research, 2012; - Vol. 95,, №2, - P. 194-204.
2. R.A. Hill, L. Tong, - P. Yuan, S. Murikinati, S. Gupta, J. Grutzendler, Regional blood flow in the normal and ischemic brain is controlled by arteriolar smooth muscle cell contractility and not by capillary pericytes // Neuron. - 2015. - Vol. 87. - P 95-110.
3. Weronika Frąk, Armanda Wojtasińska, Wiktoria Lisińska, Ewelina Młynarska, Beata Franczyk and Jacek Rysz. Pathophysiology of Cardiovascular Diseases: New Insights into Molecular Mechanisms of Atherosclerosis, Arterial Hypertension, and Coronary Artery Disease // Biomedicines 2022, - Vol. 10(8), - P. - 1938..R. Clinton Webb. Smooth muscle contraction and relaxationr. // Adv Physiol Educ. - 2003. - Vol. 27: - P. 201-206.
4. Sharifi-Rad J., Rodrigues C.F., Sharopov F., Docea A.O., Karaca A.C., Sharifi-Rad M. et al. Diet, lifestyle and cardiovascular diseases: linking pathophysiology to cardioprotective effects of natural bioactive compounds // International Journal of Environmental Research and Public Health. - 2020. - Vol. 17. - Article 2326.
5. Wang Y., Thatcher S.E., Cassis L.A. Measuring blood pressure using a noninvasive tail-cuff method in mice // Methods in Molecular Biology. - 2017. - Vol. 1614. - P. 69-73.