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Nerolidol attenuates isoproterenol-induced acute myocardial infarction in rats

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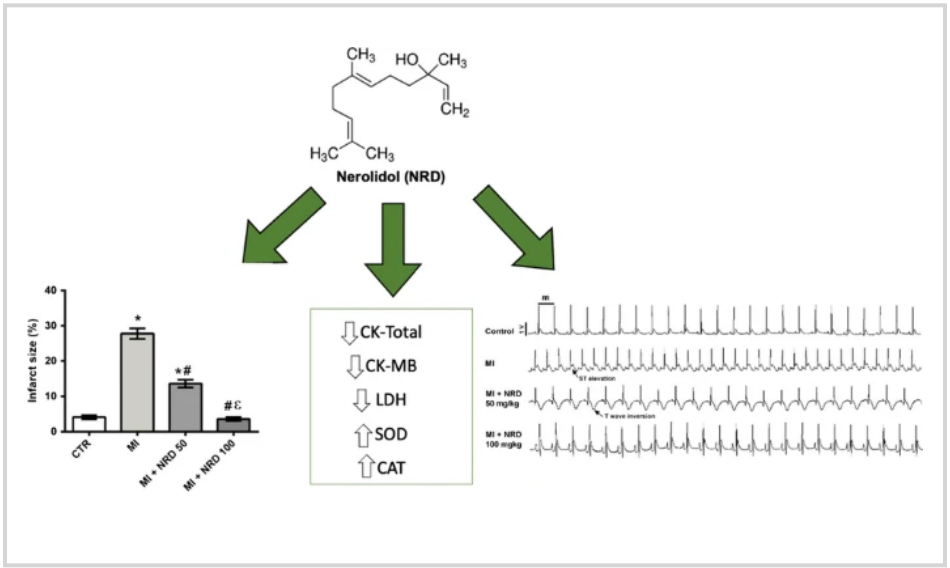
Abstract

Cardiovascular diseases have high morbidity and mortality rates, and their treatment is not effective in reducing the damage caused by myocardial infarction (MI). This study aimed to investigate whether nerolidol (NRD), a sesquiterpene alcohol, could attenuate MI in an isoproterenol-treated rat model. MI was induced by the administration of two doses of isoproterenol (ISO, 100 mg/kg, i.p.) with an interval of 24 h between doses.The animals were divided into four groups: control (CTR) (vehicle – NaCl 0.9% + Tween 80 0.2%), MI (ISO + vehicle), MI + NRD (50 mg/kg) and MI + NRD (100 mg/kg). An electrocardiogram was performed, and contractile parameters, cardiac enzymes, infarction size, and antioxidant parameters in the heart were measured to

evaluate the effects of NRD. The ISO group showed a significant rise in ST segment, QTc, and heart rate associated with a reduction in left ventricular developed pressure (LVDP), + dP/dt, and –dP/dt. In addition, there were increases in levels of creatine kinase (CK), creatine kinase-myocardial band (CK-MB), lactate dehydrogenase (LDH), and thiobarbituric acid (TBARS); reductions in superoxide dismutase (SOD) and catalase (CAT) activities; and an increase in the infarction size. Interestingly, NRD significantly attenuated almost all the parameters of ISO-induced MI mentioned above. Our results suggest that nerolidol attenuates MI caused by ISO by a marked reduction in myocardial infarct size and suppression of oxidative stress.

Graphical abstract

CK total, creatine kinase total; CK-MB, creatine kinase myocardial band; LDH, lactate dehydrogenase; SOD, superoxide dismutase; CAT, catalase. CTR (vehicle group), MI (100 mg/kg of isoproterenol), ISO + NRD 50 (50 mg/kg of nerolidol), and ISO + NRD 100 (100 mg/kg of nerolidol)



Availability of data and materials

Statistical analysis data were made available as supplementary material.

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Contributions

MSSG: methodology, formal analysis, investigation, data curation. EAPS: methodology, formal analysis, writing-original draft and review. DMS: investigation, resources, data curation. IRS: investigation, data curation. DSS: methodology, formal analysis, investigation, writing-original draft. AMA and LH: methodology, formal analysis, investigation. CMLV: methodology, resources, formal analysis, writing-original draft and review, supervision. VCOS: methodology, formal analysis, investigation. MRVS: resources, supervision, project administration, funding acquisition. RSSB: resources. LJQJ: resources, Supervision, project administration. ASB: conceptualization, methodology, resources, writing-review and editing, supervision, project administration. All authors read and approved the manuscript. The authors

declare that all data were generated in-house and that no paper mill was used.

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Ethics declarations

Ethics approval

All procedures described in the present study were approved by the Animal Research Ethics Committee of the Federal University of Sergipe (Protocol #42/2018) and followed the National Council for Animal Experiments Control (CONCEA, Brazil).

Consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Additional information

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Supplementary Information

Below is the link to the electronic supplementary material.

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Supplementary file2 (PZF 998 KB)

Supplementary file3 (PZF 10072 KB)

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