nutrients

MDPI

Article

Thymoquinone Produces Cardioprotective Effect in β-Receptor Stimulated Myocardial Infarcted Rats via Subsiding Oxidative Stress and Inflammation

Sumit Rathod [1], Yogeeta Agrawal [1], Abdulla Sherikar [1], Kartik T. Nakhate [1], Chandragouda R. Patil [2], M. F. Nagoor Meeran [3], Shreesh Ojha [3,4,*] and Sameer N. Goyal [1,*]

1 Shri Vile Parle Kelavani Mandal's Institute of Pharmacy, Dhule 424001, Maharashtra, India; sumit.rathod@svkm.ac.in (S.R.); yogeeta.goyal@svkm.ac.in (Y.A.); abdulla.sherikar@svkm.ac.in (A.S.); kartik.nakhate@svkm.ac.in (K.T.N.)
2 Department of Pharmacology, R. C. Patel Institute of Pharmaceutical Education and Research, Shirpur 425405, Maharashtra, India; crpatil@rcpatelpharmacy.co.in
3 Department of Pharmacology and Therapeutics, College of Medicine and Health Sciences, United Arab Emirates University, Al Ain P.O. Box 15551, United Arab Emirates; nagoormeeran1985@uaeu.ac.ae
4 Zayed Bin Sultan Center for Health Sciences, United Arab Emirates University, Al Ain P.O. Box 15551, United Arab Emirates
* Correspondence: shreeshojha@uaeu.ac.ae (S.O.); sameer.goyal@svkm.ac.in (S.N.G.); Tel.: +971-50-3125748 (S.O.); +91-95-5291-6993 (S.N.G.)

Abstract: Earlier studies reported that long-term treatment with thymoquinone (TQ) at a high dose (20 mg/kg) exerts a cardioprotective effect against isoproterenol (ISO)-triggered myocardial infarction (MI) in rats. In the present study, we tested the hypothesis that TQ, as a potent molecule, can exhibit cardioprotective effects at the lower dose for a short-term regimen. The rats were administered with TQ (5 mg/kg, intraperitoneal) at the 4 h interval for 2 days. ISO (100 mg/kg/day, subcutaneous) was given for 2 days to produce MI. ISO challenge results in deformation in ECG wave front, elevated left ventricular (LV) end-diastolic pressure, and reduced LVdP/dtmax and LVdP/dtmin. The levels of the cardiac biomarker in serum, such as creatine kinase MB, alanine aminotransferase, and aspartate aminotransferase, were increased. In the myocardium, a rise in malonaldehyde and decreased superoxide dismutase, glutathione, and catalase contents were observed. Furthermore, increased levels of tumor necrotic factor-α, interleukin-6, and interleukin-1β were observed in the myocardium. TQ pretreatment significantly normalized alterations in hemodynamic parameters, strengthened the antioxidant defense system, and decreased the contents of pro-inflammatory cytokines and hepatic enzymes as compared to the ISO group. Based on the results, TQ appears to be cardioprotective at low doses, and effective even administered for a shorter duration.

Keywords: myocardium; glutathione; pro-inflammatory mediators; antioxidant; hemodynamic

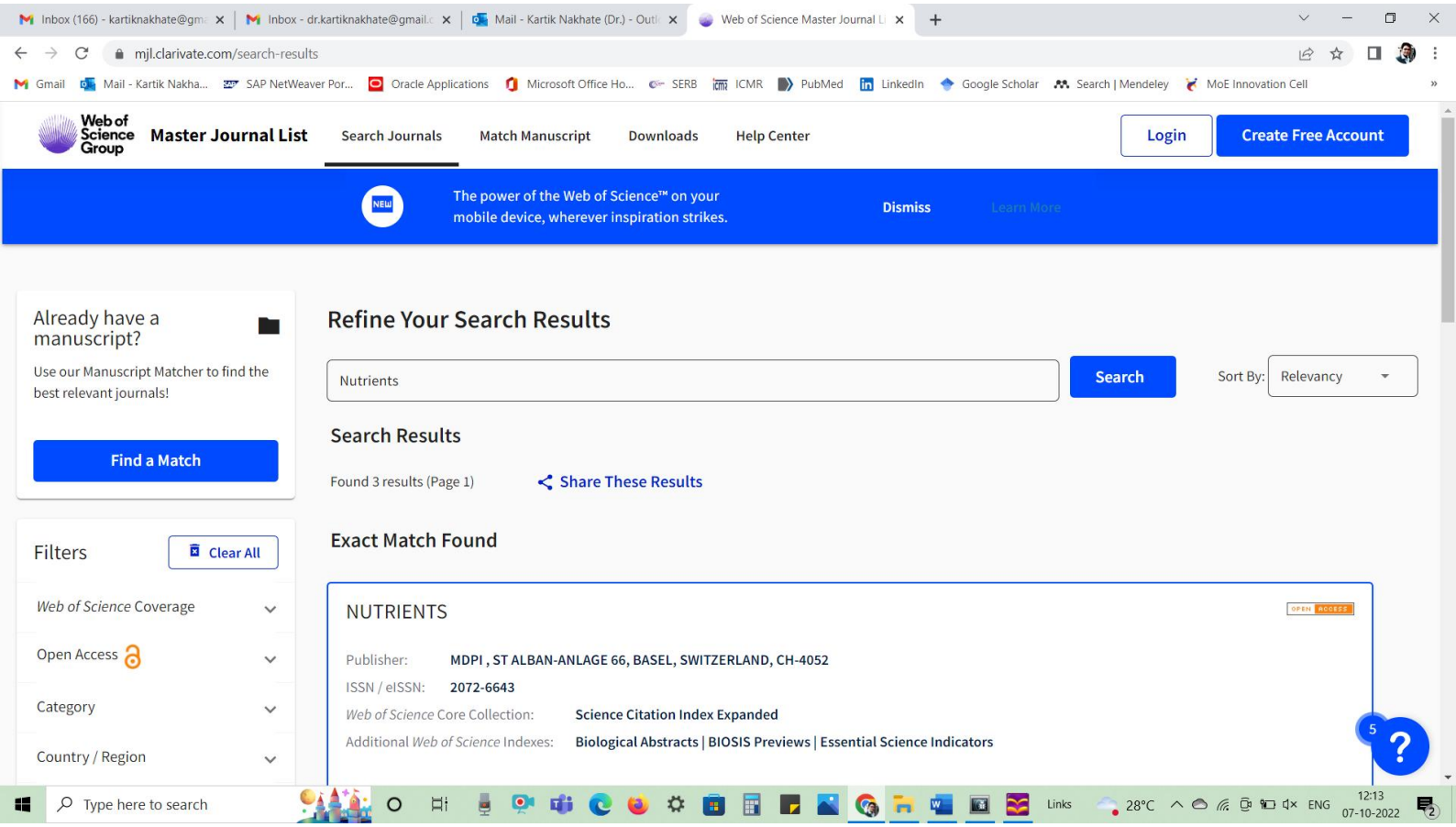
Citation: Rathod, S.; Agrawal, Y.; Sherikar, A.; Nakhate, K.T.; Patil, C.R.; Nagoor Meeran, M.F.; Ojha, S.; Goyal, S.N. Thymoquinone Produces Cardioprotective Effect in β-Receptor Stimulated Myocardial Infarcted Rats via Subsiding Oxidative Stress and Inflammation. *Nutrients* **2022**, *14*, 2742. https://doi.org/10.3390/nu14132742

Academic Editor: Rosa Casas

Received: 30 April 2022
Accepted: 7 June 2022
Published: 30 June 2022

1. Introduction

Globally, coronary heart disease (CHD) is the leading cause of morbidity and mortality. Myocardial infarction (MI) is the most common form of CHD [1]. Further, the most important hallmark of MI is heart failure which is caused by poor blood supply to the heart or deteriorating hemodynamics, resulting in cardiac death or severe hemodynamic impairment [2]. Heart failure is linked to elevated levels of certain biochemical parameters such as high lipid profile, and blood sugar along with several biological changes including high blood pressure, obesity, and aging [3]. The non-selective adrenoreceptor agonist isoproterenol (ISO) is known to trigger oxidative stress in the cardiac tissues, resulting in high-level tissue necrosis. Additionally, it increased chronotropic, inotropic, and Ca^{2+} overloads. In the process, oxidative catecholamine metabolism produced an excess of free


Inbox (166) - kartiknakhate@gm
Inbox - dr.kartiknakhate@gmail.c
Mail - Kartik Nakhate (Dr.) - Outl
Web of Science Master Journal L
mjl.clarivate.com/search-results
Gmail
Mail - Kartik Nakha...
SAP NetWeaver Por...
Oracle Applications
Microsoft Office Ho...
SERB
ICMR
PubMed
LinkedIn
Google Scholar
Search | Mendeley
MoE Innovation Cell
Web of Science Group
Master Journal List
Search Journals
Match Manuscript
Downloads
Help Center
Login
Create Free Account
NEW
The power of the Web of Science™ on your mobile device, wherever inspiration strikes.
Dismiss
Learn More
Already have a manuscript?
Use our Manuscript Matcher to find the best relevant journals!
Find a Match
Refine Your Search Results
Nutrients
Search
Sort By:
Relevancy
Search Results
Found 3 results (Page 1)
Share These Results
Exact Match Found
NUTRIENTS
OPEN ACCESS
Publisher:
MDPI , ST ALBAN-ANLAGE 66, BASEL, SWITZERLAND, CH-4052
ISSN / eISSN:
2072-6643
Web of Science Core Collection:
Science Citation Index Expanded
Additional Web of Science Indexes:
Biological Abstracts | BIOSIS Previews | Essential Science Indicators
Filters
Clear All
Web of Science Coverage
Open Access
Category
Country / Region
Type here to search
Links
28°C
ENG
12:13
07-10-2022