



Therapeutic Potential and Pharmaceutical Development of Thymoquinone: A Multitargeted Molecule of Natural Origin

Sameer N. Goyal^{1,2*}, Chaitali P. Prajapati^{1†}, Prashant R. Gore^{1†}, Chandragouda R. Patil¹, Umesh B. Mahajan¹, Charu Sharma³, Sandhya P. Talla¹ and Shreesh K. Ojha^{4*}

¹ Department of Pharmacology, R. C. Patel Institute of Pharmaceutical Education and Research, North Maharashtra University, Shirpur, India, ² SVKM Institute of Pharmacy, Dhule, India, ³ Department of Internal Medicine, College of Medicine and Health Sciences, United Arab Emirates University, Al Ain, United Arab Emirates, ⁴ Department of Pharmacology and Therapeutics, College of Medicine and Health Sciences, United Arab Emirates University, Al Ain, United Arab Emirates

OPEN ACCESS

Edited by:

Adolfo Andrade-Cetto,
National Autonomous University of
Mexico, Mexico

Reviewed by:

Eleni Skaltsa,
National and Kapodistrian University
of Athens, Greece
Ouyang Chen,
Second Military Medical University,
China

*Correspondence:

Shreesh K. Ojha
shreeshojha@uaeu.ac.ae
Sameer N. Goyal
goyal.aiims@gmail.com

[†]These authors have contributed
equally to this work.

Specialty section:

This article was submitted to
Ethnopharmacology,
a section of the journal
Frontiers in Pharmacology

Received: 10 January 2017

Accepted: 04 September 2017

Published: 21 September 2017

Citation:

Goyal SN, Prajapati CP, Gore PR,
Patil CR, Mahajan UB, Sharma C,
Talla SP and Ojha SK (2017)
Therapeutic Potential and
Pharmaceutical Development of
Thymoquinone: A Multitargeted
Molecule of Natural Origin.
Front. Pharmacol. 8:656.
doi: 10.3389/fphar.2017.00656

Thymoquinone, a monoterpene molecule is chemically known as 2-methyl-5-isopropyl-1, 4-benzoquinone. It is abundantly present in seeds of *Nigella sativa* L. that is popularly known as black cumin or black seed and belongs to the family *Ranunculaceae*. A large number of studies have revealed that thymoquinone is the major active constituent in *N. sativa* oil this constituent is responsible for the majority of the pharmacological properties. The beneficial organoprotective activities of thymoquinone in experimental animal models of different human diseases are attributed to the potent anti-oxidant and anti-inflammatory properties. Thymoquinone has also been shown to alter numerous molecular and signaling pathways in many inflammatory and degenerative diseases including cancer. Thymoquinone has been reported to possess potent lipophilicity and limited bioavailability and exhibits light and heat sensitivity. Altogether, these physicochemical properties encumber the successful formulation for the delivery of drug in oral dosages form and restrict the pharmaceutical development. In recent past, many efforts were undertaken to improve the bioavailability for clinical usage by manipulating the physicochemical parameters. The present review aimed to provide insights regarding the physicochemical characteristics, pharmacokinetics and the methods to promote pharmaceutical development and endorse the clinical usage of TQ in future by overcoming the associated physicochemical obstacles. It also enumerates briefly the pharmacological and molecular targets of thymoquinone as well as the pharmacological properties in various diseases and the underlying molecular mechanism. Though, a convincing number of experimental studies are available but human studies are not available with thymoquinone despite of the long history of use of black cumin in different diseases. Thus, the clinical studies including pharmacokinetic studies and regulatory toxicity studies are required to encourage the clinical development of thymoquinone.

Keywords: thymoquinone, pharmacological properties, therapeutic potential, formulation development, safety and adverse effects



Login

Create Free Account



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

Frontiers in Pharmacology

Search

Sort By: Relevancy

Search Results

Found 648 results (Page 1)

Share These Results

Exact Match Found

FRONTIERS IN PHARMACOLOGY

OPEN ACCESS

Publisher: FRONTIERS MEDIA SA, AVENUE DU TRIBUNAL FEDERAL 34, LAUSANNE, SWITZERLAND, CH-1015

ISSN / eISSN: 1663-9812

Web of Science Core Collection: Science Citation Index Expanded

Additional Web of Science Indexes: Biological Abstracts | BIOSIS Previews | Current Contents Clinical Medicine | Essential Science Indicators

