



OPEN ACCESS

EDITED BY

Ayman M. Mahmoud,
Manchester Metropolitan University,
United Kingdom

REVIEWED BY

Yazan Ranneh,
Al Ain University, United Arab Emirates

*CORRESPONDENCE

Qiaoyin Tan,
✉ joytam@zjnu.edu.cn

RECEIVED 04 May 2023

ACCEPTED 19 May 2023

PUBLISHED 30 May 2023

CITATION

Kong W, Zhang Y, Luo L and Tan Q (2023),
Commentary: Protective effect of
quercetin on kidney diseases: from
chemistry to herbal medicines.
Front. Pharmacol. 14:1214664.
doi: 10.3389/fphar.2023.1214664

COPYRIGHT

© 2023 Kong, Zhang, Luo and Tan. This is
an open-access article distributed under
the terms of the [Creative Commons
Attribution License \(CC BY\)](#). The use,
distribution or reproduction in other
forums is permitted, provided the original
author(s) and the copyright owner(s) are
credited and that the original publication
in this journal is cited, in accordance with
accepted academic practice. No use,
distribution or reproduction is permitted
which does not comply with these terms.

Commentary: Protective effect of quercetin on kidney diseases: from chemistry to herbal medicines

Weiya Kong¹, Yage Zhang², Liangchen Luo¹ and Qiaoyin Tan^{3*}

¹School of Sports Medicine and Rehabilitation, Beijing Sport University, Beijing, China, ²Fifth Affiliated Hospital of Harbin Medical University, Daqing, China, ³College of Teacher Education, Zhejiang Normal University, Jinhua, Zhejiang, China

KEYWORDS

quercetin, bioflavonoids, natural product, kidney injury, renal disease, kidney diseases, healthcare

A Commentary on

Protective effect of quercetin on kidney diseases: from chemistry to herbal medicines

by Chen Y-Q, Chen H-Y, Tang Q-Q, Li Y-F, Liu X-S, Lu F-H and Gu Y-Y (2022) *Front. Pharmacol.* 13:968226. doi: 10.3389/fphar.2022.968226

1 Introduction

Kidney disease is a life-threatening condition with a high mortality rate that can be caused by various factors, such as nephrotoxins, oxidative stress, or inflammation. These factors may be the main causes that promote renal injury towards fibrosis, ultimately leading to chronic kidney disease (CKD) or end-stage renal disease (ESRD) (Levey and Coresh, 2012). However, the drugs and treatment strategies currently available for treating kidney injury are still very limited.

Quercetin is a natural flavonoid with antioxidant, antihypertensive, and antidiabetic effects. Quercetin is believed to have beneficial effects in the treatment of cancer, cardiovascular disease, and metabolic disorders (Rakha et al., 2022).

We recently read a review article by Chen et al. This comprehensive review paper on the protective effects of quercetin against kidney disease covers many aspects, from pharmacokinetics and bioavailability of quercetin in traditional herbal medicine to the protective effects of quercetin against different types of kidney disease, such as nephrotoxicity, acute and chronic kidney injury, diabetic nephropathy, renal aging, and other rare kidney diseases. Overall, this is a systematic and detailed review aimed at showcasing the potential value of quercetin in the treatment of kidney disease.

2 Limitations

The most significant flaw of this study is that it summarizes multiple academic research results in a fragmented way, and the selected relevant studies are limited, and does not form a clear

argument. Firstly, the article focuses too much on listing results when analyzing different research findings, neglecting the discussion of the mechanisms themselves. For example, when discussing the relationship between chemical structure and biological activity, the corresponding relationship is not explained clearly and systematically enough. At the same time, the discussion of renal fibrosis is more focused on the inhibition of transforming growth factor β (TGF- β), but other mechanisms and factors that promote renal fibrosis are not further discussed. Do these factors interact with quercetin? Secondly, there are limitations in selecting relevant studies in the article. For example, in the section on diabetic nephropathy, further clarifications on GluT4 and AMPK signaling and EFK-related mechanisms in recent years can be introduced for hypoglycemic effects; for antioxidant effects, the interaction between the peroxisome pathway and Nrf2 and other important antioxidant pathways in diabetic nephropathy (DN) and quercetin can be introduced; for autophagy promotion, the changes in autophagy-related LC3 and the expression of other related proteins can be systematically discussed. In addition, there is a lack of analysis and comparison of different research results and opinions throughout the article, to form a more balanced and thorough conclusion.

Another drawback that has been highlighted is that the article downplays the fact that quercetin cannot yet be used for the clinical prevention and treatment of kidney disease, which may mislead clinical decision-making. Firstly, the review is too biased towards affirming the efficacy of quercetin, without fully demonstrating its toxicological characteristics and safe dosage range, and potential adverse reactions or risks. Even if it is very promising, reliable pharmaceutical pathways are yet to be found, making it difficult to achieve safety and efficiency. Secondly, most of the evidence in the review comes from animal experiments, and the judgment on human applicability is still inadequate. Appropriate clinical studies are still needed, and the conclusion appears to be too hasty. Thirdly, despite the excellent mechanistic evidence, it is still difficult to derive reasonable medication indications and differentiated treatment strategies in practical applications. The lack of in-depth analysis of the interaction between different factors such as different races, types of diseases, and disease courses largely limits its practical application.

References

Levey, A. S., and Coresh, J. (2012). Chronic kidney disease. *Lancet* 379 (9811), 165–180. doi:10.1016/s0140-6736(11)60178-5

3 Discussion

Although this review presents a highly promising treatment concept, it still needs to overcome several significant obstacles before it can be recommended as standard treatment. I hope that further research and rigorous testing can overcome its shortcomings and make the conclusion more reliable and cautious. Overall, this is a groundbreaking study, but appropriate caution needs to be taken at different stages to maximize its potential while minimizing unnecessary risks. In this process, further research and testing will be indispensable, and we look forward to it together.

Author contributions

WK wrote the manuscript, and YZ and LL contributed to the reference search. QT supervised the manuscript writing and approved the publication of the article. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Rakha, A., Umar, N., Rabail, R., Butt, M. S., Kieliszek, M., Hassoun, A., et al. (2022). Anti-inflammatory and anti-allergic potential of dietary flavonoids: A review. *Biomed. Pharmacother.* 156, 113945. doi:10.1016/j.biopha.2022.113945