

Potentials of phytotherapy on microRNAs in chronic kidney diseases

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Chronic kidney diseases (CKD) describe the loss of renal function and/or abnormal structure. CKD is linked with inflammation, oxidative stress, fibrosis, autophagy dysfunction, and mitochondrial dysfunction [1]. Currently, treatment focuses on the management of symptoms, which emphasizes the need of novel therapeutic options [2]. On the other hand, dysregulation of specific microRNA (miRNA) is associated with abnormal kidney function, rendering them important targets for treating CKD. The roots, leaves, stems and various bioactive compounds of herbal plants appear as a potential candidate for CKD therapy [3]. Thus, the current study emphasizes the phytotherapy that alters the miRNAs that are associated with CKD, focused their mechanisms and therapeutic avenues.

MiRNAs are small, non-coding RNA molecules that regulate expression of various genes. In CKD, abnormal expression of miRNA is associated with various pathophysiological processes including inflammation, fibrosis, apoptosis, and oxidative stress [4], which ultimately lead to kidney damage and dysfunction. Recent studies showed that an alteration in expression of various miRNAs is associated with CKD [5-7]. For instances, the elevated levels of miRNA-21 are associated with increased inflammation in CKD. Overexpression of miRNA-192 is implicated in renal fibrosis. Further, upregulation of miRNA-34a is associated with increased apoptosis in CKD. Conversely, decreased expression of miRNA-29 is associated with progression of fibrosis in CKD. Also, dysregulation of the miRNA-200 family is linked to oxidative stress in CKD. Besides, miRNA-200 family is also involved in kidney fibrosis. Thus, understanding the specific role of miRNA is important for developing treatment options against CKD.

There are various types of phytotherapy which are used for treating CKD targeting miRNAs. Danshen (*Salvia miltiorrhiza*), a root commonly used in traditional Chinese medicine alters miRNA-21 involved with kidney fibrosis and inflammation [8]. Another traditional Chinese medicine, Huangqi (*Astragalus membranaceus*) shows renoprotective effects against kidney fibrosis through the modulation of miRNA-192 and miRNA-29 [9]. Further, Dahuang (*Rheum officinale*), a medicinal herb used widely in China to treat CKD shows anti-fibrotic properties by targeting the miRNAs associated in kidney fibrosis [8, 10]. Thus, the modulation of miRNAs by herbal therapy may mediate various protective effects against CKD.

While CKD is a serious public health concern widely, preclinical studies indicate the potentials of herbal medicine in the management of CKD. Also, herbal medicine targeting miRNA appears as a promising option for the management of CKD, offering a holistic approach to address the multifaceted aspects of renal pathophysiology. However, it is necessary to establish their safety and efficacy using translational research

and well-designed clinical trials. Further, standardization of herbal formulations and addressing potential herb-drug interactions remain critical challenges.

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CONFLICT OF INTEREST

No conflict of interest from the authors regarding the publication of this manuscript.

AUTHOR CONTRIBUTION

MJU designed outlines of the manuscript. AM and MJU wrote and reviewed the scientific contents described in the manuscript. MJU approved the final submitted version of the manuscript.

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