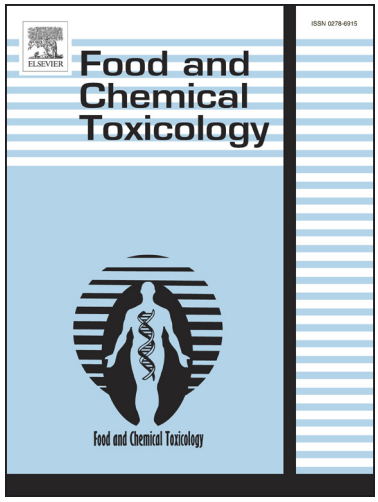

Protective effect of total flavonoids extracted from the leaves of *Murraya paniculata* (L.) Jack on diabetic nephropathy in rats

Jingtao Zou, Xiaofeng Yu, Shaochun Qu, Xuwen Li, Yongri Jin, Dayuan Sui

PII: S0278-6915(13)00805-3
DOI: http://dx.doi.org/10.1016/j.fct.2013.11.043
Reference: FCT 7716

To appear in: *Food and Chemical Toxicology*

Received Date: 26 June 2013
Accepted Date: 27 November 2013

Please cite this article as: Zou, J., Yu, X., Qu, S., Li, X., Jin, Y., Sui, D., Protective effect of total flavonoids extracted from the leaves of *Murraya paniculata* (L.) Jack on diabetic nephropathy in rats, *Food and Chemical Toxicology* (2013), doi: http://dx.doi.org/10.1016/j.fct.2013.11.043

1. Introduction

Diabetic nephropathy (DN), a frequent and major microvascular complication of diabetes mellitus, is the most common cause of end-stage renal failure disease in many countries of the world (Molitch et al., 2004). Several factors, such as hyperglycemia, hyperlipidemia, oxidative stress and inflammatory cytokines, contribute to the progression of renal damage in DN. Both type 1 and type 2 diabetes mellitus can lead to DN, but is more common in individuals with type2 diabetes. DN is characterized by glomerular and tubules hypertrophy, thickening of the basement membranes, accumulating of extracellular matrix components, glomerulosclerosis as well as tubulo-interstitial fibrosis in mesangium and interstitium (Fioretto et al., 1992; Shah et al., 2009).

Hyperglycemia can cause the activation of oxidative stress and increased production of reactive oxygen species. It can also cause the activation of proinflammatory transcription factors, resulting in enhanced inflammatory gene expression, increased flux into the polyol and hexosamine pathways, activation of transforming growth factor β (TGF-β) and the rennin-angiotensin aldosterone system (Ruggenenti et al., 2010). These factors collectively result in the accumulation of extracellular matrix proteins (ECM) in the glomeruli and tubulo-interstitium, and the cell injury and apoptosis of podocytes (Calcutt et al., 2009; Maiti and Agrawal, 2007). It is widely accepted that thickening of glomerular basement membrane and increasing of ECM are recognized as pathological symbol of DN. TGF-β_1 is considered to be the most effective profibrogenic cytokine and stimulates ECM accumulation (Tahara et al., 2008), which is widely acknowledged as one of the most important pathological characteristics of DN (Li et al., 2010).

Traditional herbal medicines have been widely used for the treatment of various diseases in the world. It has been reported that medicinal plants are used in folk medicine for the different diseases therapies and many of them are used for the therapy of DN (Honore et al., 2012; Makni et al., 2010; Sefi et al., 2012). Sefi et al showed that *Artemisia campestris* leaf extracts prevent DN by attenuating oxidative and nitrosative stress (Sefi et al., 2012).

Murraya paniculata (L.) Jack belongs to the family Rutaceae. It is a small, tropical, evergreen plant with shrub bearing small, white, scented flowers. *Murraya paniculata* is often grown in southern China (Hainan, Guangdong, Fujian and Guangxi), India, Thailand, Malaysia and Australia. The decoction of *Murraya paniculata* is administered to treat mouth ulcer and dorsal furuncle. The warm leaf paste is applied to promote the healing of broken bones among the Guangxi in southern China. In the Fujian province of China, the leaves of *Murraya paniculata* are used to relieve rheumatic pains in adults and eczema in children. Flavonoids is one of the major compounds in the leaves of *Murraya paniculata* (Shan, 2010). Our previous study showed that the total flavonoids extracted from the leaves of *Murraya paniculata* (TFMP) have hypoglycemic effects without harmful side effects (Fan, 2008). Thus, we hypothesized that TFMP may have