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## Nigella sativa oil and thymoquinone modulate early diabetic nephropathy in an experimental model of diabetic renal disease

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**Background & Aim:** Increasing evidence suggests that *Nigella sativa* oil (NSO) and its principal bioactive constituents, thymoquinone (TQ), exhibit antioxidant, anti-hyperglycemic and renoprotective effects in streptozotocin (STZ)-induced diabetes in rats. However, the potential molecular mechanisms by which NSO and TQ may exert their actions in the diabetic kidney are still poorly characterized. In an attempt to define these mechanisms, this study was designed to investigate the effect of NSO and TQ treatment on the albuminuria, podocyte injury and the complex systems controlling the extracellular matrix accumulation in the STZ-induced model of diabetic nephropathy.

**Methods:** Adult female Wistar rats were divided into four experimental groups (control, untreated STZ-diabetic, NSO and/or TQ treated diabetic rats). Treated rats received 2 mL/kg NSO or 50 mg/kg thymoquinone via oral gavage daily once for 10 weeks.

**Results:** The results showed that the albuminuria and the kidney weight/body weight ratio were increased in diabetic rats compared to control animals and were significantly ameliorated by the treatment with NSO and TQ. The real-time PCR showed that the NSO and TQ treatment prevented diabetes-induced downregulation of mRNA expression of the podocyte-specific marker (podocin) as well as the expression of matrix metalloproteinase-2. Furthermore, the overexpressions of collagen IV, transforming growth factor- $\beta$ 1 (TGF- $\beta$ 1) and vascular endothelial growth factor-A (VEGF-A) in the diabetic kidney were significantly inhibited by the NSO and TQ treatment.

**Conclusions:** These findings suggested that NSO and TQ treatment may have renoprotective effects in the early stages of diabetic nephropathy by preservation of podocyte function; along with the suppression of enhanced extracellular matrix gene expression and angiogenesis.

### Biography

Bahaa Al-Trad has completed his PhD from Leipzig University/Germany/2010 and Post-doctoral studies from University of Veterinary Medicine Vienna, Austria. Currently, he works as an Assistant Professor at the Department of Biological Sciences, Yarmouk University, Irbid, Jordan. He has published more than 10 papers in peer-reviewed journals.

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