Preface

Diabetes mellitus (DM) is a metabolic disorder which is characterised by fasting and postprandial hyperglycaemia along with hyperlipidaemia, which results from an impairment in protein, fat and carbohydrate metabolism. It is identified as the world-wide disorder persistently affecting people of all age groups. One of the major complications of DM is Diabetic nephropathy (DN), also recognised as diabetic kidney disease and, it is the most predominant element of end-stage renal failure. However, there is a lack of effective DN treatments and the mechanism that is potentially able to ameliorate renal injury is still not clear. Therefore, the present experiment was designed to investigate the therapeutic response of tetramethylpyrazine (TMP), a major active constituent of *Ligusticum chuanxiong*, a traditional medicinal plant, in type-2 diabetic (T2D) rats and to identify the possible mechanism of action. We also explored the protective actions of TMP on DN in T2D rats and further investigated the underlying mechanism of DN ameliorating action of TMP.

It was observed that TMP produces antidiabetic activity in T2D rats as identified through the improvement of diabetic metabolic parameters and alleviation of insulin resistance. The upregulation of PI3K/Akt signalling was also observed through protein expression and gene expression analysis. It signifies that PI3K/Akt/GLUT-4 signalling activation was critically involved in TMP mediated amelioration of T2D. TMP also ameliorated diabetic nephropathy in T2D rats, that was observed through the improvement in renal biochemical and morphological markers level. TMP also upregulated Akt signalling in renal tissue that lead to the reduction in renal apoptosis and reduced the oxidative stress. Therefore, it can be stated that Akt signalling activation and reduction of free radical generation were considerably involved in the improvement of DN symptoms by TMP.

In conclusion, the overall purpose of this research was to provide comprehensive knowledge to the readers about the potential therapeutic value of TMP in the treatment of T2D and its nephropathic complication.