Use of natural products in prevention and management of type 2 diabetes

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Abstract

Metabolic syndrome is an umbrella term for a group of disorders related to imbalance of energy utilization and storage. It includes obesity, hypertension, increased triglyceride levels, aberrant cholesterol levels, insulin resistance with the resulting elevated fasting blood glucose levels. Metabolic syndrome is associated with chronic low-grade local tissue inflammation and increased susceptibility to a variety of degenerative diseases. Lifestyle changes, e.g. more physical exercise, a diet rich in fruit and vegetables, can help prevent or delay metabolic syndrome related problems. In addition, certain food supplements or herbal extracts are commonly believed to make an important contribution to a healthy life style. Whereas, there is a consensus that a vegetable-rich diet contributes to a lower occurrence of metabolic syndrome related disorders, the exact nature of the compounds in the diet that contribute to prevention of degenerative diseases is still a matter of debate. Our work sets out to evaluate several models that are currently considered to play a role in the prevention or management of type 2 diabetes. Phytochemicals with antioxidant activity were long believed to be a major contributing factor in the suppression of chronic inflammation. However, all antioxidant compounds do not always have anti-inflammatory properties. Further, the peroxisome proliferator-activated receptor gamma (PPARγ)-activating potential of a wide range of natural products has been explored in great detail and resulted in a credible model. A third model considers the potential role of phytoestrogens on human physiology. These compounds are known to interact with oestrogen receptors and can modulate a range of cell signaling pathways, either as agonists or as antagonists. The efficacy of several of the identified pharmaceutically active compounds and plant extracts, either as supplements or as dietary factors as part of a healthy life style, may be underpinned by laboratory results. However, caution is justified when considering food supplements in doses that greatly exceed the amounts that would be obtained through a regular diet.

Epidemiological studies have implied that diabetes mellitus (DM) will become an epidemic accompany with metabolic and endocrine disorders worldwide. Most of DM patients are affected by type 2 diabetes mellitus (T2DM) with insulin resistance and insulin secretion defect. Generally, the strategies to treat T2DM are diet control, moderate exercise, hypoglycemic and lipid-lowing agents. Despite the therapeutic benefits for the treatment of T2DM, most of the drugs can produce some undesirable side effects. Considering the pathogenesis of T2DM, natural products (NPs) have become the important resources of bioactive agents for anti-T2DM drug discovery. Recently, more and more natural components have been elucidated to possess anti-T2DM properties, and many efforts have been carried out to elucidate the possible mechanisms. The aim of this paper was to overview the activities and underlying mechanisms of NPs against T2DM. Developments of anti-T2DM agents will be greatly promoted with the increasing comprehensions of NPs for their multiple regulating effects on various targets and signal pathways.

Metabolic syndrome is an umbrella term for a group of disorders related to imbalance of energy utilization and storage. It includes obesity, hypertension, increased triglyceride levels, aberrant cholesterol levels, and insulin resistance with resulting elevated fasting blood glucose levels that usually result in diabetes. Metabolic syndrome is associated with chronic low-grade local tissue inflammation and increased susceptibility to a variety of degenerative diseases. Lifestyle changes, e.g. more physical exercise, a diet rich in fruits and vegetables, etc. can help prevent or delay metabolic syndrome related problems. In addition, certain food supplements or herbal extracts are commonly believed to make an important contribution to a healthy life style, i.e glucomannan. Whereas there is a consensus that a vegetable-rich diet contributes to a lower occurrence of metabolic syndrome related disorders, the exact nature of the compounds in the diet that contribute to the prevention of degenerative diseases is still a matter of debate. This chapter book sets out to evaluate several natural products that are currently considered to play a role in the prevention or management of type 2 diabetes. Phytochemicals with antioxidant activity were long believed to be a major contributing factor in the suppression of chronic inflammation. However, not all antioxidant compounds have anti-inflammatory properties. Further, the peroxisome proliferator-activated receptor gamma (PPARγ)-activating potential of a wide range of

natural products has been explored in great detail, and resulted in a credible model. A third model considers the potential role of phytoestrogens on human physiology. These compounds are known to interact with oestrogen receptors and can modulate a range of cell signalling pathways, either as agonists or as antagonists. The efficacy of several of the identified pharmaceutically active compounds and plant extracts, either as supplements, dietary factors or as part of a healthy life style, may be supported by laboratory results. However, caution is justified when considering food supplements in doses that greatly exceed the amounts that would be obtained through a regular diet.

Biography :

Keti Zeka has completed her MSc from The University of L'Aquila, Italy in Medical Biotechnology and finished her PhD degree in Chemical Engineering and Biotechnology Innovation in 2015. She has been serving as a Lecturer and Tutor at the School of Medicine in L'Aquila and at the Faculty of Pharmacy in Leicester (UK). She is now a Postdoc at the University of Cambridge (UK) with an AIRC Fellowship. Her areas of expertise include the Chemistry of Medicinal Natural Products and their role in diseases prevention. Her current research interests cover the performance of diet and natural products in the prevention of degenerative diseases, focusing in optimization of metabolomics and proteomics tools in cancer and development of novel druggable agents.

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