



602/E2

Plant extract-based synthesis of zinc oxide nanoparticles and evaluation of their antidiabetic and antioxidant effect

L. L. K. S. Jayasiri, P. V. D. G. N. Silva and S. M. Vithanarachchi*

Department of Chemistry, University of Colombo, Colombo 03, Sri Lanka

Type 2 diabetes mellitus and cancer are two of the most common non-communicable diseases in the modern world, and neither has a permanent treatment. However, the widely used chemically produced drugs have several limitations, forcing scientists to look into new approaches. Nanotechnology and the use of natural products are two fascinating topics that are still in the early stages of development but have the potential to provide a wide range of therapeutic benefits. Hence, this study was focused on combining nanotechnology and natural products to biosynthesize ZnO nanoparticles using *Adenantha pavonina* and *Passiflora foetida* fresh leaves. Alpha-amylase assay and 2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assay were carried out to evaluate their *in vitro* antidiabetic and antioxidant properties, respectively. The results of selected assays for biosynthesized ZnO particles were compared with chemically synthesized ZnO particles and fresh leaf extracts. According to the findings of the alpha-amylase inhibition assay, *A. pavonina* fresh leaf extract showed a lower alpha-amylase inhibiting ability (31.90% / 100 μ l) than *P. foetida* fresh leaf extract (73.75% / 100 μ l). However, *A. pavonina* extract-based ZnO particles had a higher alpha-amylase inhibiting activity (96.17% / 100 ppm) than *P. foetida* extract-based ZnO particles (13.19% / 100 ppm). Interestingly, chemically synthesized ZnO particles also showed some alpha-amylase inhibition activity (50.00% / 100 ppm). DPPH free radical scavenging assay revealed that the fresh leaf extracts of two selected plants had a slightly higher antioxidant effect than their ZnO particles. *A. pavonina* fresh leaf extract showed lower radical scavenging activity (RSA) (57.29% / 50 μ l) than *P. foetida* fresh extract (90.58% / 50 μ l), whereas ZnO particles made from *A. pavonina* extract had a higher RSA (62.63% / 100 ppm) than ZnO particles made from *P. foetida* extract (55.96% / 200 ppm). Chemically synthesized ZnO particles prepared had no antioxidant action compared to others. Hence, *A. pavonina* and *P. foetida* fresh leaf extracts and the extracts incorporated ZnO particles could be exploited in the development of antioxidants, and antidiabetic therapeutics.

Keywords: Antidiabetic, antioxidant, *A. pavonina*, *P. foetida*, ZnO particles

E-mail: sashimv@chem.cmb.ac.lk