607/E2

Do plant-extract derived nanoparticles provide answers for chronic diseases?

D.S. Weerahannedige, P. V. D. G. N. Silva and S. M. Vithanarachchi

Department of Chemistry, University of Colombo, Sri Lanka

Nanotechnology could change the way of fundamental research, drug development, and clinical medicine. Nanoparticles are very small particles that have many applications in various fields. Plant-extract-based synthesis of metal-oxide nanoparticles is becoming a popular alternative to traditional synthetic methods. It allows nanoparticles to take on some of the properties of chemicals that are found in plant extracts. Nanomaterials made with the help of plant extracts have many uses in biology due to their smaller size; especially, making them useful for treating many diseases. Even now, there aren't many inexpensive methods to treat diabetes, so people are always looking for substitute medicines. When combined with chemicals that come from nature, nanotechnology is a promising way to make new drugs that are superior to what is already out there. The goal of our study is to make zinc oxide and iron oxide nanoparticles using plant extracts from Rathmal (*Ixora coccinea*) and Mas-bedda (*Gymnema sylvestre*) and to test their antioxidant and anti-diabetic effects in a lab setting. Rathmal is a plant that has been used in folk medicine in south-east Asia since ancient times. Mas bedda is also known to be used to treat diabetes in Sri Lanka. The results show that adding plant-derived chemicals to metal oxide nanoparticles, changes properties of those particles in new ways. Antioxidants are molecules that fight free radicals in our body. Free radicals are compounds that can cause harm if their levels become too high in the body and are linked to multiple illnesses including diabetes, heart disease, and cancer. The results of this study show that zinc oxide nanoparticles synthesized using plant extracts have a much better fighting ability against free radicals than the nanoparticles made without plant extracts. Additionally, the radical scavenging activity of nanoparticles made with Rathmal extracts sustained for a prolonged time duration. Efficiency to control diabetes was assessed by measuring the ability of compounds to prevent the activity of alpha-amylase enzyme, which is an important enzyme in sugar digestion pathway. According to our results nanoparticles made with leaf extracts of Mas bedda prevented enzyme activity more than the nanoparticles made without plant extracts. We observed that the activity of neat plant extracts decreases over time when they stored in ambient conditions. However, particles made with plant extracts were stable for 3–4 months and worked in a similar manner showing that incorporation of plant natural compounds to zinc oxide particles not only improved the antioxidant and anti-diabetic properties of nanoparticles but also stabilized the activity of plant natural compounds over the time.

*****sashimv@chem.cmb.ac.lk