World Academy of Science, Engineering and Technology
International Journal of Biotechnology and Bioengineering
Vol:14, No:06, 2020

Evaluation of Physical Parameters and in-Vitro and in-Vivo Antidiabetic Activity of a Selected Combined Medicinal Plant Extracts Mixture

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Abstract : Diabetes mellitus is one of the major public health posers throughout the world today that incidence and associated with increasing mortality. Insufficient regulation of the blood glucose level might be serious effects for health and its necessity to identify new therapeutics that have ability to reduce hyperglycaemic condition in the human body. Even though synthetic antidiabetic drugs are more effective to control diabetes mellitus, there are considerable side effects have been reported. Thus, there is an increasing demand for searching new natural products having high antidiabetic activity with lesser side effects. The purposes of the present study were to evaluate different physical parameters and in-vitro and in-vivo antidiabetic potential of the selected combined medicinal plant extracts mixture composed of leaves of Murraya koenigii, cloves of Allium sativum, fruits of Garcinia queasita and seeds of Piper nigrum. The selected plants parts were mixed and ground together and extracted sequentially into the hexane, ethyl acetate and methanol. Solvents were evaporated and they were further dried by freeze-drying to obtain a fine powder of each extract. Various physical parameters such as moisture, total ash, acid insoluble ash and water soluble ash were evaluated using standard test procedures. In-vitro antidiabetic activity of combined plant extracts mixture was screened using enzyme assays such as α-amylase inhibition assay and α-glucosidase inhibition assay. The acute anti-hyperglycaemic activity was performed using oral glucose tolerance test for the streptozotocin induced diabetic Wistar rats to find out in-vivo antidiabetic activity of combined plant extracts mixture and it was assessed through total oral glucose tolerance curve (TAUC) values. The percentage of moisture content, total ash content, acid insoluble ash content and water soluble ash content were ranged of 7.6-17.8, 8.1-11.78, 0.019-0.134 and 6.2-9.2 respectively for the plant extracts and those values were less than standard values except the methanol extract. The hexane and ethyl acetate extracts exhibited highest α-amylase (IC50 = 25.7 ±0.6; 27.1 ±1.2 ppm) and α-glucosidase (IC50 = 22.4 ±0.1; 33.7 ±0.2 ppm) inhibitory activities than methanol extract (IC50 = 360.2 ±0.6; 179.6 ±0.9 ppm) when compared with the acarbose positive control (IC50 = 5.7 ±0.4; 17.1 ±0.6 ppm). The TAUC values for hexane, ethyl acetate, and methanol extracts and glibenclamide (positive control) treated rats were 8.01 ±0.66; 8.05 ±1.07; 8.40±0.50; 5.87 ±0.93 mmol/L.h respectively, whereas in diabetic control rats the TAUC value was 13.22 ±1.07 mmol/L.h. Administration of plant extracts treated rats significantly suppressed ($p<0.05$) the rise in plasma blood glucose levels compared to control rats but less significant than glibenclamide. The obtained results from in-vivo and in-vitro antidiabetic study showed that the hexane and ethyl acetate extracts of selected combined plant mixture might be considered as a potential source to isolate natural antidiabetic agents and physical parameters of hexane and ethyl acetate extracts will helpful to develop antidiabetic drug with further standardize properties.

Keywords : diabetes mellitus, in-vitro antidiabetic assays, medicinal plants, standardization
Conference Title : ICNP 2020 : International Conference on Natural Products
Conference Location : London, United Kingdom
Conference Dates : June 29-30, 2020

Open Science Index, Biotechnology and Bioengineering Vol:14, No:06, 2020 publications.waset.org/abstracts/120980/pdf