



ABSTRACT

Herbal medicines need to be explored and developed with the occurrence of drug resistance and high rate of metabolic dysfunctions. The treatment by naturally occurring substances has always been of advantages and this fact has been accepted globally. The current research was performed to explore the *Hyophorbe indica* and *Hyophorbe lagenicaulis* of family Arecaceae for their possible medicinal significance and metabolites' identification. As per available literature, limited scientific evidence is available on these plants in spite of their traditional use as a health tonic. The hydroethanolic extract of aerial parts of both plants were prepared by using pure ethanol, water and their mixtures of various combinations. For extract preparation, the leaves were quenched with liquid nitrogen and subjected to freeze-drying. The freeze-dried leaf powder was extracted by submerging in pure water, 20% ethanol, 40% ethanol, 60% ethanol, 80% ethanol and pure ethanol for 48 hours and shook for 2 hours and sonicated for 30 minutes. The plant extracts were filtered and the extra solvent was evaporated under vacuum. Extracts were stored at low temperature in refrigerator for further use. The prepared extracts were evaluated for total phenolic contents, flavonoid contents, 2,2-diphenyl-1-picrylhydrazyl scavenging, total antioxidant power assay, α -glucosidase and α -amylase inhibitions. Proton magnetic resonance ($^1\text{H NMR}$) and ultra-high-performance liquid chromatography equipped with the mass spectrometer (UHPLC-QTOF-MS/MS) were used for phytochemical identification in most potent extract. The extract yields indicated that 60% ethanolic extract produced relatively higher amounts of extracts. The findings revealed that 60% ethanolic extracts of *H. indica* and *H. lagenicaulis* exhibited the highest total phenolic contents of 208.77 ± 2.11 and 178.56 ± 1.47 mg gallic acid equivalent per



gram dried extract, respectively. The maximum total flavonoid contents of 173.90±2.30 and 133.96 ± 1.19 mg rutin equivalent per gram dried extract were also obtained for 60% ethanolic extracts of *H. indica* and *H. lagenicaulis*, respectively. The 2,2-diphenyl picrylhydrazil activity in terms of IC₅₀ indicated that 60% ethanolic extracts of *H. indica* and *H. lagenicaulis* exhibited highest antioxidant activity of 35.35 ± 0.189 µg/mL and 43.11 ± 0.96 µg/mL, respectively. The total antioxidant power of 330.26 ± 3.13 ascorbic acid equivalent per gram plant extract (ASE/g PE) was obtained for 60% ethanolic extract of *H. indica*, which was the highest among all extracts. The total antioxidant power of 239.33 ± 3.78 ASE/g PE was obtained for 60% ethanolic extract of *H. lagenicaulis*. The β-carotene linoleic acid assay also reflected that 60% ethanolic extracts were the most active fraction to stop the β-carotene color bleaching. The highest α-glucosidase activity of 36.52 ± 0.08 µg/mL in terms of half minimum inhibitory concentration (IC₅₀) was observed for 60% *H. indica* leaf extract while it was 41.25 ± 1.25 µg/mL for *H. lagenicaulis*. The 60% ethanolic extract of *H. indica* and *H. lagenicaulis* possessed an IC₅₀ value of 58.2 ± 1.25µg/mL and 60.58±3.24 µg/mL respectively, to inhibit α-amylase activity. In case of acetylcholine esterase assay, the 60% extracts were most effective but not as effective as the extracts were for α-glucosidase and α-amylase. Metabolite profiling indicated the presence of citric acid, procyanidin B1, procyanidin B2, procyanidin B3, apigenin-c-hexocide-c-hexocide, gallic acid, kaempferol and derivatives of kaempferol and quinic acid were identified in 60% ethanolic extract of *H. indica*. Similarly, 60% ethanolic extract of *H. lagenicaulis* also possessed functional molecules like kaempferol, hesperetin-5-O-glucoside and kaempferol-coumaroyl-glucoside, isorhamnetin-3-O-rutinoside. Other identified compounds were mainly luteolin-3-glucoside, citric acid and derivative of trimethoxy flavone. The excellent

ABSTRACT



in-vitro α -glucosidase and α -amylase activities by 60% ethanolic extracts

and phytochemicals identified in these extracts urged to move for *in-vivo* antidiabetic activities in alloxan monohydrate induced diabetic mice. The mice were injected with alloxan dose of 150 mg/kg of body weight. The diabetic mice were treated with metformin 250 mg/kg of body weight. The extract doses of 250 mg/kg of body weight and 450 mg/kg of body weight were applied. The extract dose of 450 mg/kg of body weight of 60% ethanolic extract of *H. indica* was very effective to bring the elevated blood glucose level of diabetic mice within the normal range after 28 days. Moreover, the same dose was also found effective to improve the blood hemoglobin and lipid profile of diabetic mice when compared with normal mice. The antidiabetic potential of leaf extracts was most probably related to the antioxidant properties of the compounds present. These compounds were probably helpful to reduce the level of stress and to regenerate the normal functioning of the body by streamlining the metabolic processes. The findings recommend *H. indica* and *H. lagenicaulis* as the new and potent sources of antioxidant and antidiabetic agents which may be utilized to enhance the functionalities of food for the management and prevention of diabetes mellitus, which has been prevailing much and is the cause of many other malfunction of human body.