

Hypertension becomes one of the major risk factors to cardiovascular diseases. Hypertension or high blood pressure is considered present when blood pressure of arteries exceeds the normal blood pressure level, 120/80 mmHg. In recent clinical practise, hypertensive patients are treated by giving anti-hypertensive agents including ACE inhibitors, at appropriate dose. Consumption of synthetic ACE inhibitors was reported to bring side effects to human including cough, taste disturbance, angioedema, proteinuria and skin rashes. Divulgence of the ACE inhibitors' side effects has triggered scientists to investigate a safer alternative. *Ganoderma lucidum* (Curtis) P. Karst has gained popularity for over centuries due to its great reputation particularly in the prevention and treatment of a wide range of ailments. Traditional Chinese Medicine reported the extensive use of *G. lucidum* for treating hypertension. Hence, we attempt to explore the anti-ACE potential of protein fractions from *G. lucidum* mycelia water extract. *Ganoderma lucidum* mycelia were cultivated by submerged fermentation and the average yield of mycelia biomass obtained was  $4.969 \text{ g/L} \pm 0.874 \text{ g/L}$ . The mycelia crude water extract inhibited ACE at  $\text{IC}_{50}$  value of  $0.90 \text{ mg/mL}$ . Ammonium sulfate precipitation with salt at 10 % to 100 % saturation was employed to isolate the proteins. A protein profile for all the protein fractions (10 % - 100 %) has been developed through SDS-PAGE. Based on the profile, the protein fractions were pooled as fractions A, B, C, D and E. Re-evaluation of anti-ACE activity for these fractions resulted in fractions A ( $\text{IC}_{50} = 120 \text{ } \mu\text{g/mL}$ ) and C ( $\text{IC}_{50} = 109 \text{ } \mu\text{g/mL}$ ) giving approximately 9-fold and 10-fold stronger ACE inhibitory effect than the crude water extract. Following HPLC analysis, peaks collected from fraction A showed low ACE inhibitory properties at the concentration of  $25 \text{ } \mu\text{g/mL}$ . Nevertheless, HPLC peaks 3, 4 and 5 of fraction C demonstrated greater inhibition on ACE activity compared to HPLC peaks collected from fraction A. SDS-PAGE analysis revealed the presence of three

## ABSTRACT

---

protein bands in both HPLC peaks 3 and 4. Only two protein bands were detected in peak 5. Characterization of these protein bands using proteomics platform demonstrated the presence of four different proteins which are involve in the regulation of blood pressure via different mechanisms. This study suggests that the mycelia of *G. lucidum* has high potential in lowering blood pressure level due to the presence of several anti-hypertensive related proteins such as cystathionine beta synthase-like protein, DEAD/DEAH box helicase-like protein, paxillin-like protein and alpha beta hydrolase-like protein.