ABSTRACT

Panus giganteus, a culinary and medicinal mushroom consumed by selected indigenous communities in Malaysia is currently being considered for large scale cultivation. This study was performed to investigate the medicinal potential of *P. giganteus* fruiting bodies and wheat grains fermented by *P. giganteus* including antioxidant, genoprotective and hepatoprotective properties.

Ethanol extracts of *P. giganteus* fruiting bodies, wheat grains fermented by *P. giganteus* and unfermented wheat grains exhibited moderate antioxidant properties by virtue of DPPH free radical scavenging activity, reducing power, antioxidant capacity and inhibition of lipid peroxidation. The extracts also contained moderate amounts of phenolic compounds. Fruiting bodies were more potent than fermented and unfermented wheat grains in protecting DNA of peripheral blood mononuclear cell (PBMC) against hydrogen-peroxide (H_2O_2)-induced damage. However, all the extracts had comparable activities to repair DNA damaged by H_2O_2.

Hepatoprotection studies indicated that *P. giganteus* fruiting bodies were able to prevent and treat liver injury induced by thioacetamide (TAA). Administration of *P. giganteus* lowered the elevated liver body weight ratio, also restored the levels of serum liver biomarkers and oxidative stress parameters comparable to the standard drug silymarin. Gross necropsy and histopathological examination further confirmed the hepatoprotective effects of *P. giganteus.*

This is the first report on the medicinal properties of locally grown *P. giganteus*. Overall, consumption of *P. giganteus* fruiting bodies or wheat grains fermented by *P. giganteus* have genoprotective and hepatoprotective effects against injury induced by oxidative stress.

ABSTRAK

Panus giganteus merupakan cendawan yang digunakan dalam masakan dan untuk tujuan perubatan. Ia digunakan oleh masyarakat asli di Malaysia dan sedang dipertimbangkan untuk penanaman secara besar-besaran. Kajian ini telah dijalankan untuk mengkaji nilai-nilai perubatan *P. giganteus* termasuk antioksidan, potensi untuk melindungi DNA dan hati.

Ekstrak etanol dari cendawan *P. giganteus*, bijirin gandum yang ditapaikan oleh *P. giganteus* dan bijirin gandum yang tidak ditapaikan mempunyai nilai antioksidan yang sederhana. Mereka berupaya untuk menghapuskan radikal bebas DPPH, mempunyai kuasa penurunan, menunjukkan kapasiti pengoksidaan serta dapat merencatkan oxidasi lipid. Semua ekstrak juga mempunyai jumlah sebatian phenol yang sederhana. Ekstrak etanol dari cendawan lebih berpotensi daripada ekstrak lain dalam perlindungan DNA. Walaubagaimanapun, semua ekstrak adalah setanding dalam pemulihan DNA selepas dicederakan oleh H_2O_2.

Panus giganteus juga menunjukkan keupayaan untuk mencegah dan merawat kecederaan hati yang diinduksikan oleh thioacetamide (TAA). Penggunaan *P. giganteus* bukan sahaja menurunkan nisbah berat badan dengan hati, malah ia memulihkan tahap penanda biologi hati di serum dan parameter tekanan oksidasi ke paras yang setanding dengan silymarin. Ini seterusnya disahkan oleh ujian nekropsi kasar dan pemeriksaan histopatologikal.

Laporan ini merupakan kajian pertama ke atas nilai-nilai perubatan *P. giganteus* yang ditanam di Malaysia. Secara keseluruhannya, penggunaan cendawan *P. giganteus* atau bijirin gandum yang ditapai oleh *P. giganteus* berpotensi untuk melindungi DNA dan hati daripada kecederaan yang diinduksi oleh tekanan oksidasi.

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Wong Wei Lun

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LIST OF SYMBOLS AND ABBREVIATIONS

A_{blank}	Absorbance of blank
A_{sample}	Absorbance of sample
$ABTS^{\bullet*}$	2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)
ANOVA	Analysis of variance
AOAC	Association of Analytical Communities
BHT	Butylated hydroxytoluene
℃	Degree Celcius
$C_2H_3NaO_2 \bullet 3H_2O$	Sodium acetate trihydrate salt
cm	Centimetre
dH_2O	Distilled water
DMSO	Dimethyl sulfoxide
DPPH	1,1-diphenyl-2-picrylhydrazyl
EC_{50}	50% effective concentration
EtBr	Ethidium bromide
Fe^{2+}	Ferrous
Fe^{3+}	Ferric
$FeCl_3.6H_2O$	Ferric trichloride hexahydrate
$FeSO_4.7H_2O$	Ferrous sulfate heptahydrate
FRAP	Ferric reducing antioxidant power
g	Gram
GAEs	Gallic acid equivalents
GYMP	Glucose-Yeast-Malt-Peptone
HCl	Hydrochloric acid
H_2O_2	Hydrogen peroxide
$(HOCH_2)_3CNH_2$	Tris(hydroxymethyl)aminomethane

IC_{50}	Concentration to scavenge 50% free radicals
i.p	Intraperitoneal injection
KH_2PO_4	Potassium dihydrogen phosphate
K_2HPO_4	Dipotassium phosphate
$K_2O_8S_2$	Potasium persulfate
mA	Milliampere
MDA	Malondialdehyde
mg	Milligram
mg/kg	Milligram per kilogram
mg/ml	Milligram per millilitre
mg of GAEs/g	Milligram of gallic acid equivalents per gram
$MgSO_4.7H_2O$	Magnesium sulfate heptahydrate
min	Minute
ml	Millilitre
mM	Millimolar
NaCl	Sodium chloride
Na_2CO_3	Sodium carbonate
$Na_2EDTA.2H_2O$	disodium EDTA titriplex
$NaHPO_4$	Sodium hydrogen phosphate
NaOH	Sodium hydroxide
NH_4Cl	Ammonium chloride
nm	Nanometre
$O_2^{\cdot -}$	Superoxide radical
PBS	Phosphate buffered saline
PDA	Potato dextrose agar
po	Oral feeding

psi	Pound per square inch
R^2	R-squared
RDA	Recommended daily allowance
rpm	Rotation per minute
SDS	sodium dodecyl sulfate
S.E.M	Standard error of mean
TAA	Thioacetamide
TBA	Thiobarbituric acid
TBARS	Thiobarbituric Acid Reactive Substances
TCA	Trichloroacetic acid
TEP	1,1,3,3,-tetraethoxypropane
TPTZ	2,4,6-tripyridyl-s-triazine
Trolox	6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid
µ	Micro
µg	Microgram
µg/ml	Microgram per millilitre
µl	Microlitre
µM	Micromolar
µmol of $FeSO_4.7H_2O$ equivalents/g	Micromole of ferric reducing antioxidant power equivalents per gram
V	Voltage
v/v	Volume per volume
w/v	Weight per volume
±	Plus-minus
8-OH-dG	8-hydroxy-2'-deoxyguanosine
%	Percent