Anti-nociceptive, anti-inflammatory and anti-oxidative properties of *Pleurotus ostreatus*

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ABSTRACT

The anti-nociceptive potential of *Pleurotus ostreatus* (Jacquin: Fries) P. Kummer (Tricholomataceae) was investigated in rats. Male rats and female rats in pro-estrous, estrous, and di-estrous stages were orally administered with 1000 mg/kg of freeze dried *P. ostreatus*. Male rats and female rats in the di-estrous stage were also orally fed with 500 and 125 mg/kg of *P. ostreatus* suspension and the reaction time on hot plate and tail flick tests were recorded. In the hot plate test, the reaction time was significantly prolonged in male rats and di-estrous female rats upon oral treatment of high and mid doses. Marked and significant prolongation in the reaction time at 1 h in males (28% mid & 32% high dose) and up to 2 h in di-estrous females (57% mid & 79% high dose after 1 h) were observed on the hot plate test. This effect was dose dependent (male; $r^2 = 0.88$ & female; $r^2 = 0.99$). In contrast, none of the rats showed increase in reaction time in the tail-flick test. Upon oral administration of 1000 mg/kg dose of *P. ostreatus* for 30 consecutive days did not show a toxic effect. Mechanism of action of *P. ostreatus* mediated via the opioid receptors.

P. ostreatus was subjected to an anti-nociceptive activity guided fractionation procedure in order to identify the fraction having highest activity. Three extracts namely acetone, dichloromethane and hexane were prepared at room temperature using fresh *P. ostreatus* by a sequential extraction method. 500 mg/kg dose was orally administered to male rats. Acetone extract showed a significant anti-nociceptive activity on the hot plate assay 1 h of treatment (male: 68%, $P < 0.05$) whilst dichloromethane and hexane extracts did not show significant activity. The same dose of acetone extract on female rats in the di-estrous stage too showed prolongation of reaction time on the hot plate test after 1 h of treatment (female: 54%, $P < 0.05$). None of extracts showed a significant increase in reaction time on tail flick test.

The acetone extract was further fractionated by solvent partition method to obtain four fractions (hexane, dichloromethane, ethyl acetate and aqueous). Of these extracts, only the aqueous fraction (AqFrA) showed marked prolongation in reaction time on hot plate test with 500 mg/kg dose on both male rats and female rats in the di-estrous stage (male: 37%, female: 26% after 1 h of treatment). Chemical investigation of the components in AqFrA showed the presence of dulcitol and trehalose in this active fraction. The aqueous fraction (AqFrA) upon purification on a reverse phase column yielded AqFrA-1, AqFrA-2 and AqFrA-3. The oral administration of 500 mg/kg dose of these three fractions also showed marked prolongation in reaction time on the hot plate test after 1 h of treatment. (AqFrA-1: 26%, AqFrA-2: 69% and AqFrA-3: 101%). The effect was highest in the AqFrA-3 at 1 h of treatment and the effect lasted for 3 h. Hence we can conclude that the compounds responsible for the activity have a very high polarity.

The freeze dried-whole mushroom, *P. ostreatus* showed potent dose dependent oral anti-inflammatory activity mainly in the early phase of the carrageenan-induced paw edema test. The highest activity was resulted with the highest dose (1000 mg/kg, 66%) at first hour of treatment. Mid (500 mg/kg) and low (125 mg/kg) doses of *P. ostreatus* had long lasting (up to 4 h) anti-inflammatory activity.

All three extracts of *P. ostreatus* (acetone, dichloromethane and hexane) showed lipid peroxidation inhibitory activity and it was not a dose dependent effect. During the Chemical investigation of dichloromethane extract ergosterol a lipid peroxidation inhibitory compound was isolated.

It is concluded that *P. ostreatus* shows anti-nociception against neurogenic and continuous inflammatory pain possibly by opioid mechanisms and antihistamine activities. At the same time it shows anti-inflammatory and lipid peroxidation activity.