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pharmaceuticals



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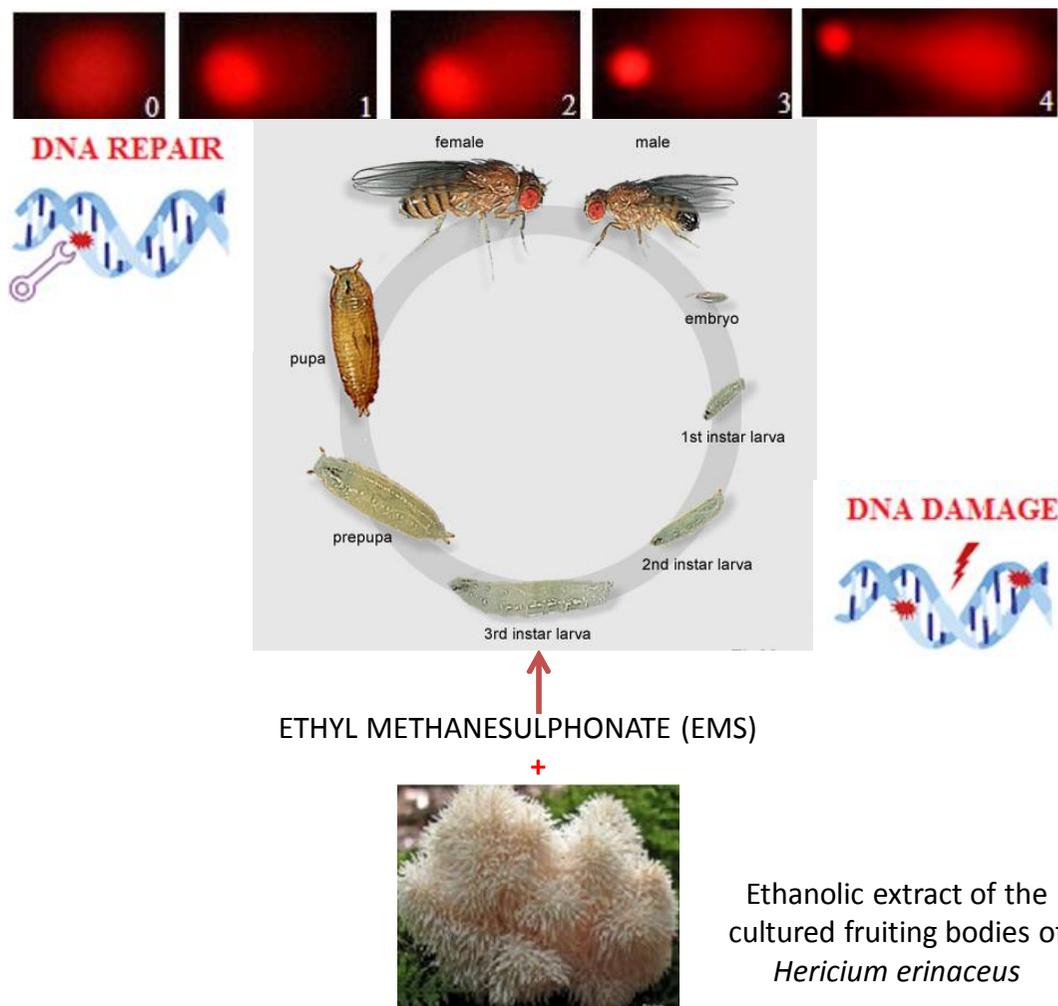
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In vivo antigenotoxic properties of *Hericium erinaceus* ethanolic extract



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Abstract:

Hericium erinaceus (Bull.) Pers., also known as lion's mane or monkey's head, is a well-established culinary and medicinal mushroom used traditionally against dementia, depression, anxiety, ulcers, heart disease, cancer, and diabetes in animals. This mushroom with a variety of health benefits has strong anti-inflammatory, antioxidant and immune-boosting abilities. Ethanolic extract of the cultured fruiting bodies of *H. erinaceus* were investigated for antigenotoxic activity against ethyl methanesulphonate (EMS)-induced genotoxicity in third instar larvae of *Drosophila melanogaster* using alkaline comet assay. A simultaneous 24-h treatment with seven different concentrations of the extract (1.25, 2.5, 5, 10, 20, 40, and 80 mg/mL standard *Drosophila* food) and 1 mM EMS, show decreased in total comet score compared to positive control. The results showed that the ethanolic extracts of *H. erinaceus* have a remarkable DNA protective activity against EMS-induced DNA damage, suggesting that this mushroom has potential to be used as a natural preventive compound against DNA damage caused by monofunctional alkylating agents such as EMS.

Keywords: *Hericium erinaceus*; antigenotoxic; *Drosophila melanogaster*, comet assay

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Introduction

Hericium erinaceus (Bull.) Pers. (Figure 1) has a long history of usage as culinary and medicinal mushroom. This mushroom has been used in folk medicine against various diseases including dementia, depression, anxiety, ulcers, heart disease, cancer, and diabetes in animals. Among these health-beneficial roles, this mushroom has strong anti-inflammatory, antioxidant and immune-boosting abilities. To the best of our knowledge, the *in vivo* protective potential of ethanolic extract of *H. erinaceus* against ethyl methanesulphonate (EMS)-induced genotoxicity in third instar larvae of *Drosophila melanogaster* have not been investigated so far.



Figure 1. *Hericium erinaceus* (Bull.) Pers.
(<https://morningchores.com/growing-lions-mane-mushrooms/>)

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Results and discussion

The protective effect of ethanolic extract of the cultured fruiting bodies of *H. erinaceus* against ethyl methanesulphonate (EMS)-induced genotoxicity in third instar larvae of *D. melanogaster* was assessed using alkaline comet assay (Table 1).

Results showed that EMS effectively induced DNA damage by significantly increasing the total comet score with mean frequency of 147.6 ± 0.84 .

A simultaneous 24-h treatment with seven different concentrations of the extract (1.25, 2.5, 5, 10, 20, 40, and 80 mg/mL standard *Drosophila* food) and 1 mM EMS, show a decreases in total comet score compared to positive control.

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Table 1. Antigenotoxic activity of different doses of *Hericium erinaceus* extract

Groups	Comet class					Total comet score ^a	% R ^b
	0	1	2	3	4		
I	77.4±0.8	22.6±0.23	/	/	/	22.6±0.62 [†]	/
II	13.8±0.42	41.3±0.62	28.4±0.34	16.5±0.62	/	147.6±0.84 [*]	/
III	41.5±0.62	33.5±0.43	23.9±0.21	1.1±0.57	/	84.6±0.71 ^{*†}	50.4
IV	39.21±0.44	41.5±0.82	18.1±0.22	1.19±0.32	/	83.02±0.24 ^{*†}	53.1
V	34.7±0.32	52.7±0.54	11.2±0.81	1.4±0.54	/	79.3±0.21 ^{*†}	54.6
VI	51.3±0.35	35.2±1.40	13.5±0.32	/	/	62.2±0.51 ^{*†}	68.3
VII	61.2±0.5	29.6±0.61	9.2±0.32	/	/	48±0.22 ^{*†}	79.7
VIII	52.7±0.34	43.1±0.21	4.2±0.24	/	/	42.2±0.34 ^{*†}	76.9
IX	69.4±0.32	29.2±0.54	1.4±0.42	/	/	32±0.51 ^{*†}	92.5

^aThe values are mean ± S.D. from three independent experiments. ^b%R, percentage of reduction. I-Negative control; II-Ethyl methanesulfonate, 1 mM; III-Ethanol extract of *Hericium erinaceus* 1.25 mg/mL + 1 mM EMS; IV-Ethanol extract of *Hericium erinaceus* 2.5 mg/mL + 1 mM EMS; V-Ethanol extract of *Hericium erinaceus* 5 mg/mL + 1 mM EMS; VI-Ethanol extract of *Hericium erinaceus* 10 mg/mL + 1 mM EMS; VII-Ethanol extract of *Hericium erinaceus* 20 mg/mL + 1 mM EMS; VIII-Ethanol extract of *Hericium erinaceus* 40 mg/mL + 1 mM EMS; IX-Ethanol extract of *Hericium erinaceus* 80 mg/mL + 1 mM EMS. * $p < 0.05$ when compared with the negative control group; [†] $p < 0.05$ when compared with the positive control group.

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Results and discussion

As can be seen from Table 1, a concentration-dependent reduction in the DNA damage were observed upon simultaneous treatment with extract and EMS.

EMS-induced DNA damage was reduced even at low concentrations of the extract with a percentage reduction greater than 50%.

At high concentration (80 mg/mL) the ethanolic extract of *H. erinaceus* caused almost completely reduction in DNA damage in third instar larvae of *D. melanogaster* with %R of 92.5%.

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Conclusions

The results showed that the ethanolic extract of *H. erinaceus* had a remarkable DNA protective activity against EMS-induced DNA damage, and therefore encourage further studies on identification of antigenotoxic constituents and elucidation of the mechanisms underlying their antigenotoxic effect.

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