



IN VITRO ANTICANCER ACTIVITY OF PAPAIN HYDROLYSATES OF OYSTER MUSHROOM (*Pleurotus ostreatus*) PROTEIN

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ABSTRACT

Key words: Oyster mushroom, anticancer activity, Papain hydrolysates, MTT assay, Percentage cell inhibition, Percentage cell viability.

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Plan: The present study has been undertaken to evaluate the in vitro anticancer activity of papain hydrolysates of Oyster mushroom (*Pleurotus ostreatus*) protein.

Preface: Oyster mushroom protein was isolated by phosphate buffer method and concentration of protein was found to be 24mg/g of Oyster mushroom.

Methodology: The total protein was enzyme hydrolysed by papain (enzyme and substrate was added at a ratio of 1:5) In vitro anticancer activity was studied by Percentage cell inhibition in MCF-7 cell line using MTT assay. In vitro percentage cell viability was tested in vero cell line.

Outcome: Papain hydrolysates was found to be having highest percentage cell inhibition of 75.82% at 100 µg/ml, 89.83% at 500 µg/ml concentration respectively in MCF-7 cell line. Papain hydrolysates were found to be having highest percentage cell viability of 97.23% at 100 µg/ml and 83.72% at 500 µg/ml concentration respectively.

1. INTRODUCTION

Oyster mushrooms (*Pleurotus ostreatus*) have medicinal properties and also good source of protein and can be grown easily¹. In human diet edible mushrooms have long been used². It has been reported³ that leading cause of death in developing countries is cancer. Chemotherapeutic agents used for the treatment for cancer kill the cancer cells and also kill normal cells and has lot of side effects. So there is a growing demand to treat cancer with natural products. Many research has been carried out on plant extracts. Mushrooms are also screened for anticancer activity. It has already been reported that different solvent extracts of mushrooms has anticancer effect. So far there are no reports on anticancer activity of Oyster mushroom protein.



Recently peptide drugs have gained lot of interest as they overcome the problems of drug resistance. When the proteins are hydrolysed, the peptides are released which have potential activities against bacteria, fungi, parasites and cancer. Hence the present study has been undertaken to evaluate the *in vitro* anticancer activity of Papain hydrolysed Oyster mushroom protein.

2. MATERIALS AND METHODS

Total protein from Oyster mushroom was extracted by Phosphate buffer method ⁴ and the total protein content was estimated by biuret method.

2.1. Analysis of percentage cell inhibition in Cancer cell line

Percentage cell inhibition by Oyster mushroom total protein and Papain hydrolysates were analysed by using MTT assay in Cancer cell line MCF-7⁵. Oyster mushroom total protein and papain hydrolysates were taken at different concentrations ranging from 100-500µg/ml.

2.2. Analysis of percentage cell viability in Vero cell line

Percentage cell viability by Oyster mushroom total protein and Papain hydrolysates were analysed by using MTT assay in Vero cell line⁵. Oyster mushroom total protein and papain hydrolysates were taken at different concentrations ranging from 100-500µg/ml.

3. RESULTS AND DISCUSSION

The total protein concentration was found to be 24mg/g of Oyster mushroom. The percentage cell inhibition by total protein and papain hydrolysates in MCF cell line are given in Fig.1.

Percentage Cell inhibition in MCF-7 cell line by total protein was found to be 69.20%, 72.40%, 80.70%, 80.90% and 85.90% at 100,200,300, 400 and 500 µg/ml concentration respectively. The % cell inhibition by papain hydrolysate in MCF-7 cell line was found to be 75.82%, 82.02%, 86.42%, 89.22% and 89.83% at 100,200,300, 400 and 500 µg/ml concentration respectively.

The % cell viability by total protein and Papain hydrolysates are given in Fig.2. The percentage cell viability by total protein in Vero cell line was found to be 95.6%, 92.3%, 88.0%, 83.80% and 78.3% at 100,200, 300, 400 and 500 µg/ml concentration respectively. The percentage cell viability by papain hydrolysates was found to be 97.23%, 94.35%, 93.11%, 87.76% and 83.72% respectively.

Sung Hak lee et al⁶ demonstrated the human colon cancer cells HT-29 proliferation inhibitory effect by hot water extracts of *Inonotus obliquus*. Byung Tae Park et al ⁷ reported cytotoxicity effect of a protein (CMP) from *C.militaris* (*Cordyceps militaris*) mushroom against human breast and bladder cancer cells. Three subfractions obtained by ethanol extractions of Chaga mushrooms (*Inonotus obliquus*) had *in vivo* antitumor effects on Sarcoma -180 cell bearing mice. Anticancer effect of hot water extract of *Pleurotus ostreatus*, *Pholiota nameko*, *Pleurotus spodoleucus* mushrooms against sarcoma 180 has been reported by Ikekawa et al ^{8,9}.

Ajith et al¹⁰ reported antitumor effects of ethyl acetate, methanol, and aqueous extracts of *Phillinus rimosus* mushrooms against Ehrlich ascites carcinoma and Dalton's lymphoma ascites.

There are no much reports on antitumor effects of mushroom protein. In the present study the papain hydrolysates of Oyster mushroom protein was found to be having highest cell inhibition % of 89.83 at 500 µg/ml and 75.82% at 100 µg/ml in MCF-7 cell line when compared to total protein as such which is having 85.9% and 69.2% at 500 and 100 µg/ml concentration respectively.

The percentage cell viability by total protein in Vero cell line was found to be 95.6% and 78.3% at 100 and 500 µg/ml concentration respectively. The percentage cell viability by papain hydrolysates was found to be 97.23% and 83.72% at 100 and 500 µg/ml concentration respectively.

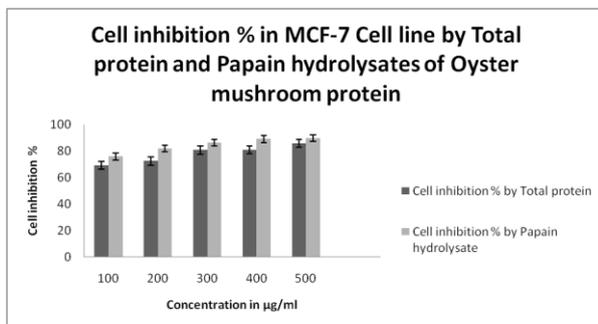


Fig.1. Cell inhibition % in MCF -7 Cell line by Total protein and Papain hydrolysates of Oyster mushroom protein

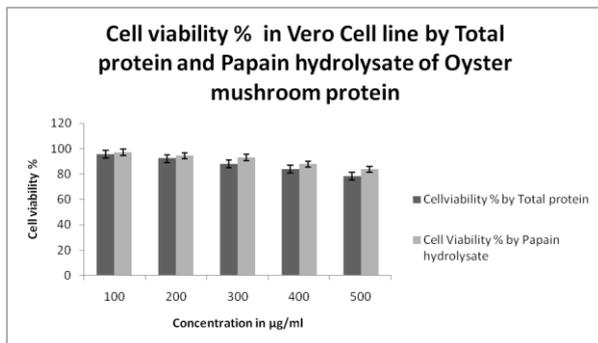


Fig.2. Cell viability % in Vero Cell line by Total protein and Papain hydrolysates of Oyster mushroom protein

4. CONCLUSION

Papain hydrolysates of Oyster mushroom protein is found to be having anticancer activity when tested against MCF-7 cell line and found to be having higher cell inhibition % when compared to Oyster mushroom protein as such. Hence Papain hydrolysate could be a potential anticancer drug. In future in vivo animal studies can be carried out to prove the anticancer effect

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