ENDOPHYTIC PESTALOTIOPSIS SPECIES FROM ANDAMAN ISLANDS: A POTENTIAL PANCREATIC LIPASE INHIBITOR

SUBHA JYOTI SARKAR, DIVYA DIOUNDI, MAHITI GUPTA*
Department of Biotechnology, Lovely Professional University, Phagwara, Punjab, India. Email: mahitigupta@gmail.com

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ABSTRACT

Objective: Obesity is the major cause of deaths worldwide. Inhibition of enzymes involved in breakdown of fats can be a good way for obesity management. Pancreatic lipase (PL) causes 50-70% degradation of ingested fats. The aim of this work is to explore the endophytic fungi from the untapped biodiversity of Andaman Islands for PL inhibitors.

Methods: In the current report, culture broths of 39 endophytic fungi from different curative plants of coastal regions of India have been tested for their potential PL inhibitory activity. The bioactive compound was thus isolated, purified, and analyzed using gas chromatography.

Results: It was found that inhibitory concentration of a compound (R²=0.64) isolated from crude hexane extract of endophytic fungal isolate from Citrus limon was 15.46 µg/ml. Gas chromatogram of the extract showed the presence of caryophyllene which might be responsible for the particular activity. The bioactive fungus was microscopically identified as Pestalotiopsis species.

Conclusion: As caryophyllene is component of many oils and is non-toxic, so it can be potential source of safe and effective anti-obesity drug.

Keywords: Pancreatic lipase, Endophytic fungi, Caryophyllene, Gas chromatography.

INTRODUCTION

Discovery of penicillin from Penicillium notatum brought a revolution in the age of antibiotics. Since then, fungal domain has been constantly explored for various bioactive metabolites. Over the past two decades, another group of fungal system known as endophytes that reside inside the plant has been constantly explored for its potential pharmaceutical applications. Endophyte produces certain biochemicals that protect the host plant from biotic and abiotic stress [1]. With the course of evolution, these host plant endophytes gain the property to produce similar compounds like their host. In the past decade, over 500 fungal metabolites have been used as potential drugs [2].

Pancreatic lipase (PL) is the main target as anti-obesity agent due to its important role in metabolism of fats. Orlistat is only partly natural PL inhibitor that too has been isolated from a bacterial source Streptomyces toxytricini which also serves certain side effects [3]. Shortage of safe and reliable PL inhibitors has motivated researchers to explore new sources for PL inhibitors that might be eukaryotic in origin. Endophytic fungi still remain poorly explored wealth for PL inhibitor.

In the present study, endophytic fungi from medicinal plants of Andaman Islands of India have been explored for their potential to inhibit PL that can further be targeted in obesity management. Culture filtrates of 39 endophytic fungi from three different medicinal plants were tested for their potential to inhibit PL inhibitory activity as described by Kim et al. [6]. Endophytes showing inhibition percentage more than 50% were partially purified using silica-methanol (70:30). The compounds separated on silica plates of three different Rf values were analyzed for compounds present using gas chromatography and mass spectroscopy (GC-MS). Around 39 endophytic fungal isolates were obtained from which about 38% fungal cultures have been isolated from Aegle marmelos, 36% from C. limon, and rest from Azadirachta indica. From these 39 endophytes, only 5 cultures showed PL inhibitory activity above 50%. Among these 9CLSTHA, isolated from stems of C. limon showed inhibition percentage of 83% followed by 23AMLBP (75%) from A. marmelos. After solvent extraction, there was slight increase in lipase inhibitory activity of all the selected culture filtrates. The hexane extract of 9CLSTHA inhibited PL by 87%. The hexane extract was then resolved into three bands on silica plates of three different Rf (0.46, 0.64, and 0.85). IC₅₀ of compound 2 (Rf=0.64) was better than compound 1 and 3. It inhibited PL with an IC₅₀ of 15.46 µg/ml. GC-MS analysis of bioactive compound showed the presence of caryophyllene (Fig. 1).
The first peak at retention time 7.584 minutes matches with caryophyllene. Caryophyllene is a sesquiterpene which is a component of oils. Terpenes have been known to possess anti lipase activity [10]. Caryophyllene has been known to possess antioxidant, anti-acne, and anticancer activities [11,12]. Using microscopic tools, the bioactive fungi was identified as *Pestalotiopsis* sp. Colonies on PDA were white, cottony, and raised, and margins were nearly round (Fig. 2).

Continuous research on anti-obesity drugs has made scientist realize the importance of different ways to treat obesity. Despite the present era, the new drugs in the market are ineffective and are combined with side effects. These anti-obesity drugs are still the combination of old salts with slight modifications. People are now again moving to Ayurveda. Till date, after orlistat, no other natural drug has got the Food and Drug Administration approval, so the present report might confirm it a safe and effective anti-obesity drug.

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**REFERENCES**