CONFERENCE PROCEEDING

Determination Of Polysaccharide From '*Cendawan Busut*' Crude Water Extract

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Abstract

Termitomyces is a genus of edible mushrooms commonly consumed in Africa and Asia among the mushroom collected from the wild. Several species of *Termitomyces* are commonly used for health promotion and treatment of illness. In this study, *Termitomyces* sp. Mushroom or locally known as *'cendawan busut'* were isolated from Kuala Pilah. Negeri Sembilan, Malaysia. It was called as *'cendawan busut'* because *Termitomyces* mushroom grow as symbionts in the termite nest, where they produce various enzyme to help termites digest lignocellulosic substrate. The bioactive compound (polysaccharide) was extracted from the mushroom fruiting bodies using hot-water extraction method. Fourier-Transform Infrared Spectroscopy (FTIR) analysis was carried out to confirm the presences of polysaccharide compound in the mushroom fruiting bodies extracts. Result demonstrated that polysaccharides are present in *Termitomyces* sp. mushroom fruiting bodies extract as it was compared with standard laminarin polysaccharide.

Keywords: *Termitomyces, polysaccharide, hot water extraction, mushroom*

INTRODUCTION

Termitomyces sp. is a genus of edible mushrooms commonly consumed in Africa and Asia among the mushrooms collected from the wild (Hsieh, 2018). Apart from protein, *Termitomyces* sp. is an affluent source of sugar, fibre, lipid, vitamin, mineral in addition to medicinal value which is used in lower blood pressure, rheumatism, kwashiorkor, obesity, diarrhoea and purgative (Song et al, 2010). *Termitomyces* sp. is a popular wild edible mushroom grown in termite gut where they produce various enzymes to help termites digest lignocellulosic substrates (Venkatachalapathi et al, 2016). In Negeri Sembilan, Malaysia, this mushroom is normally consumed as local food and believed by the local people that it benefits to their health. To date there is no scientific prove reported on the ethnomedicinal properties and the cultivation technique of *Termitomyces* sp. mushroom mycelium.

In this research, the *Termitomyces* mushroom collected form Negeri Sembilan were dried and the crude extract from the mushroom fruiting bodies was furthered analyse for the existence of polysaccharides.

MATERIALS AND METHODS

Mushroom collection

The fruiting bodies of *Termitomyces* sp. was successfully collected from Kampung Sungkak, (Senaling), which is located in Negeri Sembilan. Table 1 shows the coordinates and the image of obtained *Termitomyces* sp. mushroom sample.

Table 1. Coordinates and the image of the obtained *Termitomysces sp*. mushroom sample:

Area	Code	Picture
Senaling, Kuala Pilah Latitude 2.7069° N Longitude 102.2484° E	TM 1	

Extraction of Polysaccharides using Hot Water Extraction (HWE)

Intracellular polysaccharide hot water extracts (IPS HWE) were extracted. Briefly, 20 g of dried mycelia powder was extracted twice with distilled water (250 mL) at 80°C for 3 hours in water bath. The extracts were cooled, filtered and the filtrates were dried at 50°C in oven (Ahmad et al, 2015).

Ethanol Extraction

Culture filtrates were mixed with 4 times of absolute ethanol (1:4 ratio), stirred vigorously and kept overnight at 4°C. The mixture was filtered using Whatmann No.1 filter paper and polysaccharide were dried at 50°C in the oven yielding extracellular polysaccharide ethanol extracts (EPS EE). For intracellular polysaccharide ethanol extracts (IPS EE), a modified hot water extraction used. Briefly, the powders of dried mycelia (20 g) were extracted twice with distilled water (250 mL) at 80°C for 3 hrs in a water bath. The extracts were cooled, filtered using filter paper (Whatmann No. 1) and precipitated using ethanol (1:4) before drying in the oven at 30°C (Ahmad et al, 2014).

Characterization of ß-glucan using Fourier transform infrared spectroscopy (FTIR)

FTIR analysis was performed using Agilent Cary 630 equipped with diamond ATR (attenuated total reflectance). A HWE sample (0.5 g) was placed on a clean window, and the pressure clamp was closed until a click was heard. Then, the data was collected using MicroLab software (Agilent, Santa Clara, CA, USA).

RESULTS AND DISCUSSION

Fourier transform infrared spectroscopy (FTIR)

The position and anomeric configuration of the glycosidic linkage in the glucan of the targeted HWE from *Termitomyces* extracts was identified using FTIR spectroscopy. Overall, the adsorption in the region between 1250 cm^{-1} and 1650 cm^{-1} indicated the polysaccharide (Wang et al., 2009). It was found that the HWE from *Termitomyces* also exhibited similar peak absorption within the stated range. Table 2.0 showed the description of peak obtained from the FTIR spectra (Figure 1.0). Thus, based on the absorption peaks, it could be summarized that the structural characteristics of the polysaccharide of HWE from *Termitomyces* sp. mushroom was a ß-glucan.

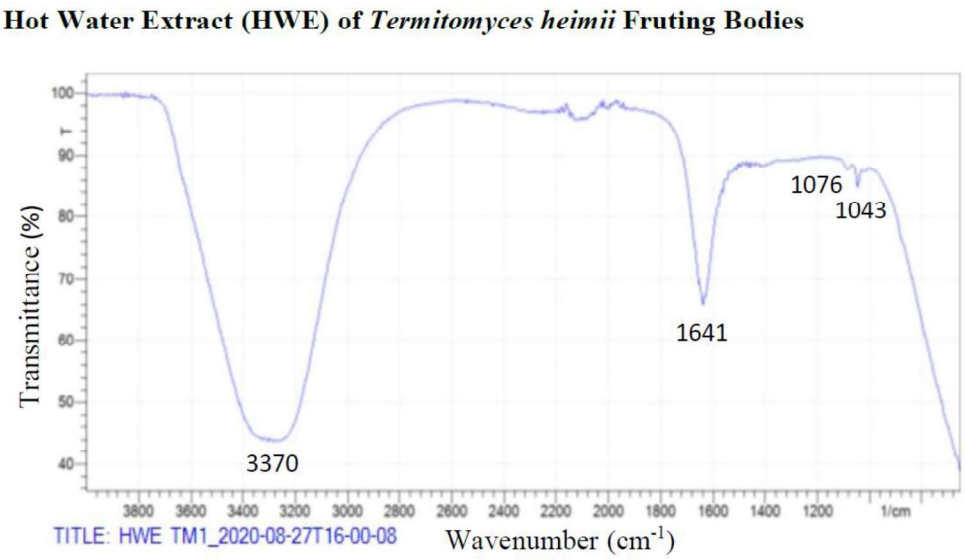

Figure 1. FTIR spectra result of ß-glucan from fruiting bodies hot water extract of *Termitomyces* sp. mushroom

Table 2. FTIR analysis of HWE from *Termitomyces* sp. mushroom extracts

Group	Vibration Mode	Peak (cm^{-1})	Indicator
O-H	O-H stretching vibration	3370	The strong, broad peak indicated the stretching vibration of O-H groups in the sugar residue as well as showing the presence of polyhydroxilic compound (Wan-Mohtar et al., 2016)
C=O	Symmetric and asymmetric stretching vibration	1641	The absorption peak shows the water bending vibration in polysaccharide (Usuldin et al., 2020)
C-O	C-O stretching vibration	1043, 1076	The presence of C-O, C-OC and O-H stretching vibration resembles the characteristics of a polysaccharide structure (Wan-Mohtar et al., 2016)

CONCLUSION

The ß-glucan (polysaccharide) of hot water extract from *Termitomyces* sp. mushroom fruiting bodies was successfully identified.

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