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Abstract

Optimized Extraction of Glycoproteins from *Ganoderma lucidum* †

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Ganoderma mushrooms are a valuable source of bioactive compounds [1]. One type are glycoproteins, which were demonstrated to be able to support symbiotic bacterial biofilm formation and aid in the dispersal of dysbiotic biofilm [2]. The aim of this study was to optimize the extraction of glycoproteins from *Ganoderma lucidum* in order to use them in various applications, such as obtaining oral health products. A three factors, two levels optimization plan was used for glycoprotein extraction from *Ganoderma lucidum* powder. The chosen plan aims to evaluate the statistical significance of the following interaction terms: three main effects (A, B, C), three secondary interaction effects (A × B, B × C, A × C) and a tertiary effect (A × B × C). Following ANOVA analysis, each effect is associated with a *p* value, which is a measure of the correlation between effect and response variabilities. Total protein was determined using a copper-based assay (Biuret) against a bovine serum albumin (BSA) standard curve [3]. The molecular weights of the proteins were analysed on sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE). Total water-soluble carbohydrates were measured using a phenol–sulfuric acid (PSA) assay against a glucose standard curve. The extracts were characterized using Fourier transform infrared spectroscopy (FTIR). The analysis of the experimental data pointed out to a correlation between the input and output variables, exhibiting a suitable ratio between the interaction terms, in order to increase the glycoprotein extraction yield. The SDS-PAGE profile shows a narrow distribution of molecular weights (MW), with several intense bands under 5 kDa. FTIR analysis showed structural bond vibrations caused by IR radiant energy absorption that are characteristic for monosaccharide, amidic and glycosidic bonds at specific frequencies/wavenumbers, and showed a variation in the intensity and position of bands within the experimental parameters. The data analysis provided an optimized process in order to obtain glycoproteins from *Ganoderma lucidum*, which could be used for different biomedical applications.

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