

Abstract

The purpose of this study was to formulate a functional sponge cake with resistant starch and polysaccharide isolated from *Pleurotus ostreatus* (edible mushroom). The native corn starch was modified into resistant starch by hydrothermal treatment (physical method) with six different temperature cycles involving gelatinization at 121°C for 60 min and storing at refrigerated conditions for 24h. The physiochemical characterization of modified starch and *Pleurotus ostreatus* polysaccharide were evaluated to know their functional attributes. Morphological study of the native and modified corn starch by Scanning Electron Microscopy revealed the conversion of granular smooth structure into a continuous network with irregular shape. X-ray diffraction studies have shown partial conversion of A-type structures to B-type. Differential Scanning Calorimetry (DSC) studies showed a clear shifting of endothermic peaks towards lower temperatures. No new bond formations in the modified starches were revealed from the Fourier Transform Infra Red (FTIR) absorption studies. The % RS of the modified starch after two autoclaving and cooling showed the highest (73.7 ± 0.00 %). Cycle 1, 2 and 3 samples however exhibited lower hydrolysis indicative of complex undigestible fractions. Cycle 2 samples exhibited lowest hydrolysis after 3 h (180 min). The hydration capacity of the modified starches increased as compared to the native starch. The polysaccharide extracted from *Pleurotus ostreatus* exhibited a good DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging activity (77.6 ± 0.01 %) along with a good antibacterial activity against *Bacillus subtilis* and *Staphylococcus aureus* giving an inhibition zone of 9 mm and 14.5 mm respectively. The XRD (X-ray diffraction) study of the polysaccharide revealed a poor crystalline structure. Two sponge cakes were formulated by substituting 20% of the flour with RS (20%); (Cake_{RS}) in one and polysaccharide (5%) plus RS(15%); (Cake_{RS+M}) in the other one. Both the form of cake showed a good overall sensory acceptability, and textural data as analysed by SYSTAT (version 6.0.1 1996, SPSS INC., USA) software showed only a Significant difference from control in hardness ($P < 0.001$) with storage time (upto 7 days). The rest of the properties like springiness and gumminess were not significantly different from the control. DPPH study of the cake showed that the cake with substituted polysaccharide has a good (77.6 ± 0.01 %) scavenging activity. The substituted cake did not show any difference in calorific value (5.15, 5.16 and 5.21 cal/g) for control, Cake_{RS} and Cake_{RS+M} respectively, as estimated in a bomb calorimeter. The formulated cake with both resistant starch and polysaccharide have shown good properties like textural, sensory and good anti-oxidative properties.