Optimization of extraction conditions of gelatin from buffalo (Bubalus bubalis) skins using response surface methodology

ABSTRACT

The present study was to determine optimum conditions for gelatin extraction from the skin of buffalo (Bubalus bubalis) using response surface methodology. A central composite design (CCD) was performed to evaluate the effects of NaOH concentration (X1), pre-treatment time (X2), extraction temperature (X3), and extraction time (X4) on the yield (Y1), gel strength (Y2), and hydroxyproline content (Y3) of the extracted gelatin. The optimal combination of the independent variables for a good gelatin yield with high gel strength and hydroxyproline content was found at X1 (0.77 M), X2 (5.08 h), X3 (62.93 ◦C) and X4 (11.62 h). The experimental values for Y1 (16.91%), Y2 (236.5 g), and Y3 (41.4 g/100 g) were in good agreement with the predicted values of 17.87% yield, 237.80 g gel strength and 41.90 g/100 g of hydroxyproline content. Extraction temperature and extraction time were observed to be the most important factors that influenced the yield, gel strength, and hydroxyproline content, meanwhile pre-treatment time showed negative correlations with the yield and hydroxyproline content of the extracted gelatin. This study demonstrated that manipulation of specific parameters could improve extraction efficiency without compromising the quality of buffalo gelatin, thereby promoting it as an alternative source for gelatin production.