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## Abstract

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Molecular Weight of  $\beta$ -Glucan Affects Physical Characteristics, In Vitro Bile Acid Binding, and Fermentation of Muffins

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Muffins containing different amounts and molecular weights (MW) of  $\beta$ -glucan were evaluated for the effect of  $\beta$ -glucan on the physical characteristics of the muffins and on in vitro bile acid binding and fermentation with human fecal flora. Wheat flour muffins were prepared with the addition of  $\beta$ -glucan extracts with high-, medium-, or low-MW. For oat flour muffins, the native oat flour contained high-MW  $\beta$ -glucan; the oat flours were treated to create medium- and low-MW  $\beta$ -glucan within the prepared muffin treatments. For each 60-g muffin, the amounts of  $\beta$ -glucan were 0.52, 0.57, and 0.59 g for high-, medium-, and low-MW  $\beta$ -glucan wheat flour muffins, and 2.38, 2.18, and 2.23 g for high-, medium-, and low-MW  $\beta$ -glucan oat flour muffins, respectively. The lower the MW of the  $\beta$ -glucan in muffins, the lower the height and volume of the muffins. The oat flour muffins were less firm and springy than the wheat flour muffins as measured on a texture analyzer; however, MW had no effect on muffin texture. The oat flour muffins bound more bile acid than did the wheat flour muffins. The muffins with high-MW  $\beta$ -glucan bound more bile acid than did those with low- and medium-MW  $\beta$ -glucan. Muffin treatment affected the formation of gas and total short-chain fatty acids (SCFA) compared with the blank without substrate during in vitro fermentation. There were no differences in pH changes and total gas production among muffin treatments. The high-MW  $\beta$ -glucan wheat flour muffins produced greater amounts of SCFA than did the wheat flour muffin without  $\beta$ -glucan and the oat flour muffins; however, there were no differences in SCFA production among muffins with different MW. In general, the  $\beta$ -glucan MW affected the physical qualities of muffins and some potential biological functions in humans.

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