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Australian mushroom β-glucan content and in vitro bile-acid binding capacity compared to oats

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Mushrooms are one of the few foods that are high in β-glucan. β-glucan's cholesterol lowering properties from oat and barley is well established, but it's not clear whether mushroom β-glucan has similar functionality. We aimed to analyse the β-glucan content in Australian mushrooms and evaluate their bile acid binding capacity, the primary cholesterol lowering mechanism of β-glucan. Raw, boiled and fried Australian grown *Agaricus bisporus* (button, cup, flat and brown mushrooms) and *Pleurotus* spp. (shimeji and oyster) were freeze dried and the β-glucan content determined using a Megazyme kit. Oat β-glucan was measured using an Association of Official Agricultural Chemists method (AOAC 995.16). An *in vitro* digestion method was used to assess bile acid binding capacity of mushroom and oat β-glucans. [(1,2)] Samples were analysed in triplicate and statistically compared using ANOVA. The β-glucan content of freeze-dried raw *A. bisporus* mushrooms (4.5 to 8.1 g/100g) were similar to that of oats (7.6 g/100g, all $p > 0.05$), whereas *Pleurotus* mushrooms contained ~5x more β-glucan (32.5–37.4 g, $p < 0.05$). As mushrooms are high in moisture (~90%), β-glucan content was much lower in fresh *A. bisporus* mushrooms compared to oats (0.3–0.7% v. 6.9%, respectively, $p < 0.05$) while *Pleurotus* mushrooms contained 3.2% (oyster) and 3.7% (shimeji) β-glucan. Boiling increased β-glucan content of oyster, button, flat and brown mushrooms by 3–7% ($p < 0.05$) but frying had no effect and neither cooking method affected β-glucan content of shimeji or cup mushrooms. Bile acid binding capacity of *A. bisporus* mushrooms (29–36%) was equivalent to raw oats (36%, $p > 0.05$) whereas the bile acid binding capacity of oyster mushrooms (22%) was lower than oats ($p < 0.05$). Cooking increased bile acid binding capacity which was related to changes in β-glucan content. Serving sizes of 150–300 g raw, 80–200 g cooked or 10–20 g freeze dried *A. bisporus* mushrooms were estimated to provide 1 g of β-glucan (amount required per serving of oats or barley for a high-level health claim related to cholesterol lowering) compared to 30 g raw, 20–40 g cooked or 3 g freeze-dried *Pleurotus* mushrooms and 14 g raw oats. In conclusion, although *Pleurotus* mushrooms had higher β-glucan levels compared to *A. bisporus* and oats, their bile acid binding capacity was significantly lower. *A. bisporus* (button, cup, flat, brown) mushrooms had similar bile acid binding properties to oats, but levels of β-glucan in fresh mushrooms were low. The cholesterol lowering effects of mushrooms, and acceptability of consumption at required levels, needs to be confirmed by clinical trials.

References

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