EFFECTS OF WHOLE WHEAT AND WHEAT BRAN, POLLARD AND WHITE FLOUR ON PLASMA CHOLESTEROL IN RATS

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Effects of grain products on plasma cholesterol vary widely. Thus, it is accepted that oat bran and barley flour lower plasma cholesterol in experimental animals and humans but that wheat bran is neutral. It is thought that the water-soluble non-starch polysaccharides (NSP) present in the former increase faecal steroid excretion so draining the body pool. Effects of wheat are equivocal and some human and animal experiments suggest that wheat bran raises plasma cholesterol under some conditions (Topping, 1991). Accordingly, we have compared the effects of common commercial wheat fractions on plasma cholesterol in rats.

Adult male rats (160-170 g of body weight) were fed a semi-purified diet based upon casein, white wheat flour and corn oil and containing 63 g of NSP/kg of diet. To this diet was added that wheat's pollard or bran in quantities found in the parent grain both 92 g of NSP/kg of diet. The remaining group of animals were fed the same diet but with whole wheat flour containing both the bran and pollard fractions and providing 125 g of NSP/kg of diet. After 18 days, concentrations of plasma cholesterol and caecal bile acids and neutral sterols were measured.

Plasma cholesterol concentrations were lowest with white flour diet with a mean of 2.57±0.06 mmol/L. Concentrations were higher, but not significantly, with pollard and bran with mean values of 2.81±0.08 and 2.90±0.12 mmol/L, respectively. Plasma total cholesterol averaged 3.11±0.17 with whole wheat, significantly higher than the white flour but not different to the other two groups. Bile acid concentrations in caecal dry matter were highest with white flour (29 mg/g), intermediate with wheat bran (17 mg/g) and lowest with whole wheat (12 mg/g) and pollard (9 mg/g). Total neutral sterols showed a similar pattern with concentrations of 4.9 mg/g with white flour, 2.2 mg/g with wheat bran, 2.0 mg/g with pollard and 1.2 with whole wheat.

These data show that the lowest plasma cholesterol concentrations (and the highest caecal steroids) were obtained with commercial flour used to bake white bread. Addition of wheat pollard and bran raised plasma cholesterol and lowered caecal steroids which supports the view that they may raise plasma cholesterol in man, possibly through diminished steroid excretion. The data obtained with white flour are very similar to those obtained with oat bran. In a recent human study, Swain et al. (1990) showed that oat bran gave similar plasma cholesterol as a "low-fibre" wheat flour diet suggesting that the former product was ineffective. The NSP content of the wheat flour was not determined but if it were similar to the present study, then an alternative conclusion might be that both white flour and oat bran lowered plasma cholesterol.

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