

## Dietary oxalate reduction after inoculation of *Oxalobacter formigenes* in fecal batch culture systems

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Hyperoxaluria is a condition of excessive urinary oxalate secretion, a condition frequently associated with kidney stones. The human diet contains a considerable quantity of oxalate and plays a significant role in raising urinary oxalate levels<sup>(1)</sup>. Moreover, probiotic treatment has been reported as a successful strategy for lowering urinary oxalate<sup>(2)</sup>. *Oxalobacter formigenes* is an anaerobic intestinal bacterium with the ability to break down oxalate, thus may impact on hyperoxaluria<sup>(3)</sup>. Thus the aim of present study was to assess the oxalate status after inoculation of *O. formigenes*. In the current study, faecal microbial fermentation was carried out by the use of an *in vitro* batch culture system along with test foods (wheat bran)<sup>(4)</sup>. Pure oxalate salt was used as a control substrate. Analysis of organic acids, oxalate and formate, was performed using a method described by Savage *et al.* and Ehrlich<sup>(5,6)</sup>. Samples were collected for subsequent analysis at 0 min, 2, 4, 8 and 24 h. ANOVA analysis with Tukey HSD test was used to assess the significant differences.

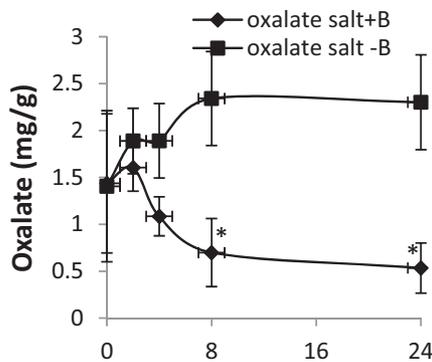


Fig. 1. Fate of oxalate from sodium oxalate salt with (+B) and without (-B) bacteria.

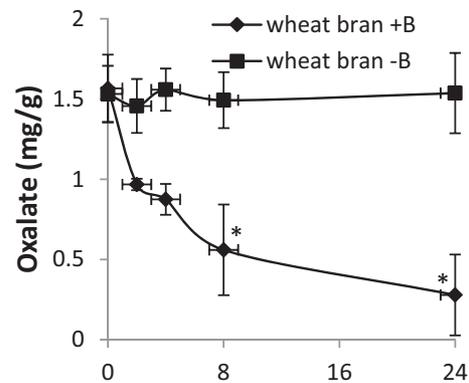


Fig. 2. Fate of oxalate from wheat bran with (+B) and without (-B) bacteria. \* = Significant reduction of oxalate after addition of *O. formigenes* i.e.  $P < 0.05$ .

Oxalate levels decreased after addition of *O. formigenes* whilst food was being fermented. However, a continuous increase in oxalate was observed under the same conditions without the *O. formigenes* addition (Fig. 1 and 2;  $P < 0.05$ ). Reduction of oxalate in the test food sample was due to increased levels of soluble oxalate that has been reported to be approximately 30% of the total oxalate<sup>(7)</sup> enabling *O. formigenes* to work efficiently following fermentation of wheat bran and in the presence of oxalate salt. In conclusion, *O. formigenes* was observed to reduce oxalate levels in an *in vitro* colonic batch system, suggesting that there is a potential for this microorganism to reduce hyperoxaluria *in vivo*. Therefore the probiotic *O. formigenes*, may be an effective strategy to reduce plasma oxalates in those who have suffered kidney stones, although this requires testing in a randomly controlled human study for confirmation.

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