Xyloglucan: a new agent to protect the intestinal mucosa and to prevent bacterially- mediated alteration of tight junction permeability.

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Background: Xyloglucan (XG) is a water-soluble hemicellulose from vascular plants, indigested by digestive enzyme. This polysaccharide has various application areas like drug-delivery technology, food technology and textile industry. It has also been suggested that it may act as a film-forming barrier distributed on the intestinal mucus layer able to protect the mucosa from chemical or bacterial aggression. However until now, no data has yet been published to confirm such hypothesis.
Aims: Our studies aimed to evaluate both in vitro and in vivo the potency of xyloglucan to prevent the bacterial toxin- induced -increase permeability and the subsequent epithelial cell bacterial invasion.
Methods: A first series of experiments performed *in vitro* on co-cultured CaCo2/Goblets cells submitted to *E. coli* inoculation, XG was added on the apical site of the bath both preventively and curatively. Changes in tight junction (TJ) permeability was measured by TEER, Lucifer yellow transfer, E. coli adhesion and epithelial cell invasion were counted. In a second series performed in vivo, Wistar rats received orally XG (12,5mg/kg) and 2 h. later were injected IP with LPS from *E. coli*. Jejunal strips were collected 6 hours later for in vitro TJ permeability measurement using FITC-dextran and mucosal myelo-peroxidase (MPO) activity as a marker of inflammation. In a last series, XG was given orally associated or not with gelatin or co-administered with cholera toxin (CT) into isolated jejunal loops in anesthetized rats. Evaluation of CT-induced water secretion was performed 2hours later.
Results: *In vitro,* given preventively XG (2.5mg/200µl), reduced significantly by 78% the degree of *E.coli* mucosal colonization after 30min. Added curatively , 1after *E.coli* inoculation, XG attenuated by 87% the decrease in TEER measured 3h. later. Administered orally 2 hours before LPS, XG (12.5mg/kg) reduced significantly ($P \leq 0.01$) by 81.8% the LPS-triggered increase in permeability and subsequently by 63.2% the increase in mucosal MPO activity. When administered orally 4h earlier (12,5mg/kg) or 12h earlier with gelatin (250mg/kg), XG suppressed CT-induced water secretion. Co-administered locally with CT at dose of 0.75 and 1.25mg/loop, XG reduced (67%) or suppressed respectively, the secretory effects of CT,.
Conclusions: Both in vitro and in vivo data indicate that xyloglucan has protective effects on intestinal bacterial invasion, alterations of gut permeability and CT-induced intestinal secretion reaching 12h when associated with gelatin These data support that this compound may be of therapeutic interest in the treatment of infectious diarrhea.