

ABSTRACT

Metabolic Effects of the Consumption of Coat Protein Transgenic Papaya (*Carica papaya* L.) in Rats

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The *Papaya ringspot virus* (PRSV) is a major deterrent to the commercial production of papaya worldwide. Given the absence of resistance in commercial varieties, transgenic papaya expressing viral sequences was developed to control the disease in Jamaica. Concerns have been raised regarding the safety of genetically modified crops. For assurance of safety, a sub-chronic whole-food feeding study was designed to evaluate the biochemical effects of consumption of the transgenic papaya, PRSV infected papaya, the transformation proteins, neomycin phosphotransferase II, β -glucuronidase and the viral coat protein in rats.

All the animals appeared healthy throughout the study and feed efficiency and weight gain were comparable across all treatment groups ($p>0.05$). At necropsy, no significant differences were noted in the absolute or relative weights of the liver, kidney, intestine and spleen for the transgenic test groups relative to the control ($p<0.05$). Supplementation with the virus infected papaya and the marker

proteins resulted in reduced weights of the kidney and spleen ($p < 0.05$) which may not be toxicologically meaningful in the absence of adverse effect on these organs.

There appeared to be no detrimental effect on organ integrity as the levels of activities of acid and alkaline phosphatase and aspartate and alanine aminotransferase in the plasma, liver, kidney acid were comparable ($p > 0.05$).

There was no oxidative damage, as evidenced by the activities of key antioxidant enzymes in the liver and kidney and lipid peroxide levels in these organs were also comparable for the test groups relative to the control ($p > 0.05$).

The activities of intestinal amylase, lipase and the disaccharidases were not negatively affected by supplementation with the test diets.

Magnesium and sodium-potassium ATPase activity in the treatment groups were not statistically variable ($p > 0.05$). However, supplementation with transgenic papaya peel significantly reduced calcium ATPase activity in the distal region of the intestine, presumably due to biological variations.

Significant differences in plasma triglycerides, markers of hepatotoxicity, were found for both the transgenic papaya and reference comparator when compared to the control ($p < 0.05$) but values were within the expected range.

The histopathological results showed microscopic findings that were of minimal severity and were randomly distributed across the groups. There were no abnormalities that were considered to be diet related.

Keywords: transgenic papaya, genetically modified, aspartate and alanine aminotransferases, acid and alkaline phosphatases, disaccharidases, amylase, lipase, ATPases, antioxidant enzymes, lipid peroxides, lipid, histopathology, liver, kidney, spleen, intestine.