Protective effect of dried fruits of *Carica papaya* on hepatotoxicity in rat
Introduction

Despite tremendous development in the field of medical science, liver diseases are still the threatening problems to our health. Virus related liver diseases are important causes of morbidity and mortality in Bangladesh. HBV and HCV are emerging as important etiological factor for such disease in Bangladesh (Ahmed, 2005). Viral hepatitis has become a menace to public health in Asia and Africa, making development of inexpensive control measures urgent (Al-Qarawi et al., 2001). The absence of an effective treatment in modern medicine has made it urgent to search for suitable herbal drugs for treating hepatic disorders. The hepatoprotective activity of Moringa oleifera (Ruckmani et al., 1998), Cocculus hirsutus (Thakare et al., 2009), Caseria esculenta (Jayakar et al., 1999), Trianthema decandra (Balamurugan and Muthusamy, 2008) and Phyllanthus niruri (Iqbal et al., 2007) have been described.

Carica papaya Linn (Family:Caricaceae) is a short, fast growing large herb. The green fruit contains papain similar to pepsin, pulp of the fresh fruit contain a soft yellow resin, fat, albuminoid sugar and pectin. Leaves contain an alkaloid called carpine and a glucoside named carposide (Samson, 1986). C. papaya is commonly cultivated and planted in Bangladesh for its edible fruits, also grows naturally in Waste Lands. Fruit of C. papaya is a rich source of vitamin C. It also contains vitamin E, pectin and carotinoids. Fruits, latex and juice of C. papaya are digestive and have been reported to be used in dyspepsia, intestinal irritation, habitual constipation and chronic diarrhea. The fruit is also useful in treating bleeding piles and enlarged spleen and liver (Ghani, 2003). To combat the increasing liver diseases in Bangladesh, it is essential to explore our plant resources to develop an effective hepato-protective agent for the benefit of our people. The present study was chosen to investigate the effect of dried fruits of C. papaya on hepatotoxicity in rat. The aqueous and ethanol extracts of C. papaya showed significant hepatoprotection against carbon tetrachloride induced hepatotoxicity. The protective activity was evaluated by using biochemical parameters such as serum bilirubin, serum alanine aminotransferase and aspartate aminotransferase and alkaline phosphatase. The histopathological changes of liver were compared with control.

Materials and Methods

The fruits of C. papaya was brought from a local market in Dhaka city. The preparation of the aqueous and ethanol extracts were performed in the Department of Chemistry of Dhaka University. The green fruits of C.

Abstract

Aqueous and ethanol extracts of Carica papaya has been evaluated for its hepatoprotective activity in rats. The aqueous and ethanol extracts of C. papaya showed significant hepatoprotection against carbon tetrachloride induced hepatotoxicity. The protective activity was evaluated by using biochemical parameters such as serum bilirubin, serum alanine aminotransferase, aspartate aminotransferase and alkaline phosphatase. The histopathological changes of liver were compared with control.
papaya were cut into small pieces, shade dried and powdered. To prepare aqueous extract, 200 g of powdered fruits of papaya were taken and mixed with 1500 mL of distilled water in a conical flask and kept for 24 hours with occasional shaking and stirring. Then filtration through fine cloth and kept for further 24 hours followed by refiltration by vacuum pump. Then the whole extract was concentrated with rotary vacuum evaporator under low temperature. Then the extract was put into freeze dryer to make it powder. Finally the extract was stored in refrigerator.

The decrease in mean serum ALP level in the aqueous extract of Carica papaya was highly significant (p<0.001). The decrease in mean serum AST level in the aqueous extract of Carica papaya was highly significant (p<0.001). The decrease in mean serum ALT level in the aqueous extract of Carica papaya pretreated group was highly significant (p<0.001; Table I). The decrease in mean serum AST level in the ethanol extract of Carica papaya pretreated group was highly significant (p<0.001). The decrease in mean serum ALT level in the ethanol extract of Carica papaya pretreated group was highly significant (p<0.001). The decrease in mean serum ALT level in the aqueous extract of Carica papaya pretreated group was highly significant (p<0.001). The decrease in mean serum AST level in the ethanol extract of Carica papaya pretreated group was significant (p<0.01). The decrease in mean serum ALP level in the aqueous extract of Carica papaya pretreated group was significant (p<0.01). The decrease in mean serum ALP level in the ethanol extract of Carica papaya pretreated group was significant (p<0.01).

Histological examination of the liver sections pretreated with extracts of Carica papaya showed remarkable reduction

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<td><strong>Effects of pretreatment with Carica papaya on mean serum bilirubin, ALT, AST and ALP levels in CCl&lt;sub&gt;4&lt;/sub&gt;-treated rats</strong></td>
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N = 6 rats in each group. *p<0.05, **p<0.01, ***p<0.001 when compared to control group. Values are expressed as mean ± SE

**Results**

Experiment I resulted in elevated level of biochemical parameters in CCl<sub>4</sub>-treated group indicating the hepatotoxic effects of carbon tetrachloride. In Experiment II, the decrease in mean serum bilirubin level in the aqueous and ethanol extract of Carica papaya pretreated group was not significant. The decrease in mean serum ALT level in the aqueous extract of Carica papaya pretreated group was highly significant (p<0.001; Table I). The decrease in mean serum ALT level in the ethanol extract of Carica papaya pretreated group was highly significant (p<0.001). The decrease in mean serum AST level in the aqueous extract of Carica papaya pretreated group was highly significant (p<0.001). The decrease in mean serum AST level in the ethanol extract of Carica papaya pretreated group was significant (p<0.01). The decrease in mean serum ALP level in the aqueous extract of Carica papaya pretreated group was significant (p<0.01). The decrease in mean serum ALP level in the ethanol extract of Carica papaya pretreated group was significant (p<0.01).
in necrosis and degenerative changes against carbon tetrachloride.

Discussion

In hepatotoxicity, the most important mechanism of cell injury by carbon tetrachloride involves the formation of reactive free radicals and subsequent lipid peroxidation. The free radicals produced locally cause autooxidation of the polyeneic fatty acids present within the membrane phospholipids. There oxidative decomposition of the lipid is initiated and organic peroxides are formed after reacting with oxygen (Kumar et al., 1992). The lipid peroxidative degradation of biomembranes induced by carbon tetrachloride causes hepatotoxicity which is evidenced by an elevation in the serum marker enzymes namely AST, ALT, ALP and total bilirubin (Kaplowitz et al., 1986).

In this study, the aqueous and ethanol extracts of *Carica papaya* decreased the carbon tetrachloride induced elevated levels of the enzymes like serum ALT, AST and ALP which were statistically significant compared to control group. It was also found that aqueous extract of *C. papaya* showed more significant hepatoprotection than that of ethanol extract. This finding may indicate the dominant anti-oxidant effect of vitamin C which is richly contained in *C. papaya*. Histological examination of the liver sections pretreated with extracts of *C. papaya* showed remarkable reduction in necrosis and degenerative changes against carbon tetrachloride (data not shown). The finding of this study is in agreement with that of the study of the effect of dried fruits of *C. papaya* Linn on hepatotoxicity (Rajkapoor et al., 2002) although they have demonstrated a more complete recovery. The variation could be due to different animal models used.

Conclusion

This study shows the hepatoprotective effect of *C. papaya* on carbon tetrachloride-induced hepatotoxicity in experimental rats.

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Conflict of Interest

Authors declare no conflict of interest

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