Annona senegalensis extract demonstrates anticancer properties in N-diethylnitrosamine-induced hepatocellular carcinoma in male Wistar rats

- Yakubu O.F.[a],
- Metibemu D.S.[b],
- Adelani I.B.[a],
- Adesina G.O.[a],
- Edokwe C.B.[a],
- Oseha O.E.[a],
- Adebayo A.H.[a]

Abstract

Background: Hepatocellular carcinoma (HCC) is a common and leading cancer around the globe. This study investigated the anticancer properties of extract of Annona senegalensis in N-diethylnitrosamine (DEN) - induced hepatocellular carcinoma in male Wistar rats. Methods: Rats were simultaneously induced with a combination of 100 mg/kg b.wt of DEN and 0.5 mL/kg of carbon tetrachloride (CCl_4) intraperitoneally once a week for three weeks in a row. Thereafter, animals were treated with 100 mg/kg and 200 mg/kg b.wt of A. senegalensis extract daily for 21days. Analysis using gas chromatography-mass spectrometry (GC–MS) was carried out to discover the phytoconstituents contained in the n-hexane extract of A. senegelensis. The levels of liver function parameters and antioxidant enzyme activities were determined via spectrophotometric analysis. Reverse transcriptase-polymerase chain reaction technique was used to assess the gene expression patterns of BCL-2, P53, P21, IL-6, FNTA, VEGF, HIF, AFP, XIAP, and EGFR mRNAs. Results: Treatment of DEN-induced hepatocellular carcinoma Wistar rats with the extract caused significant ($p < 0.05$) decrease in the activities of ALT and AST. It also resulted in a reduction of the concentration of MDA and a significant increase ($p < 0.05$) in SOD and GSH activities. IL-6, BCL-2, VEGF, EGFR, XIAP, FNTA, and P21 mRNAs expressions were significantly ($p < 0.05$) downregulated after treatment. Histopathological analysis revealed that the extract improved the liver architecture. Conclusion: A. senegelensis n-hexane extract demonstrates its anticancer properties by improving the liver architecture, increasing the antioxidant defense systems, downregulating the pro-inflammatory, anti-apoptotic, angiogenic, alpha-fetoprotein and farnesyl transferase mRNAs expression and hitherto up-regulate the expression of tumor suppressor (P21 and P53) mRNAs.

Author keywords

Annona senegalensis; Gene expression; Hepatocellular carcinoma; N-Diethylnitrosamine