



Evaluation of hepato protective activity of methanolic extract of *Sorghum Vulgare*

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Abstract

The objective of the present investigation is to elucidate hepatoprotective activity of Methanolic fruit extract of *Sorghum vulgare*. in paracetamol induced liver damage in Wister rats. Liver damage was produced by paracetamol (2gm/kg, p.o.) in 1% CMC. The Plant extract (200mg/kg, p.o.) was administered every 24 hrs for seven days, while standard group received N-acetyl l-cystine. At the end of the study the marker enzymes in serum were analysed. The methanolic extract showed significant hepatoprotective activity and efficacy of extract was almost comparable to that of N-acetyl l-cystine.

Keywords: Hepatoprotective, Methanol, N-acetyl l-cystine, paracetamol

Abbreviations: Carboxy methyl cellulose (CMC), *Sorghum vulgare* methanol extract (SVMC)

Introduction

Herbal medicines have recently attracted much attention as alternative medicines useful for treating or preventing life style related disorders and relatively very little knowledge is available about their mode of action. There has been a growing interest in the analysis of plant products which has stimulated intense research on their potential health benefits. The liver, because of its strategic anatomical location, is exposed to many kinds of xenobiotics and therapeutic agents. Moreover, the rapidly increasing morbidity and mortality rates from liver diseases are largely attributable to the repeated chemical insult either from drug abuse or from environmental pollution. Unfortunately so far, in the modern era of medicine there is no specific treatment to counter the life threatening impact of these dreaded conditions though N-acetyl l-cystine can reverse the pathology due to paracetamol induced injury. Several plants have been investigated and reported to possess antioxidant property and hepatoprotective activity¹ e.g. *Baliospermum montanum*, *Ocimum sanctum*, *Sorghum vulgare* etc. Similarly *Sorghum vulgare L.* is a widely distributed plant throughout India, and is a popular folk medicine. The fruit pulp of the plant has been reported in traditional medicine as a curative for various ailments such as diarrhea, pruritis, impotence, dysentery, heart disease, vomiting, and anorexia, and has also been used for the treatment of asthma and tumours, as a liver tonic and peptic ulcer. Heteropolysaccharide from *Sorghum vulgare L.* has reported to have anticancer activity^{2,3}. However hepatoprotective activity of *Sorghum vulgare L.* fruits has not been scientifically investigated. Therefore, the present study is planned to investigate the effect of methanolic extract H of *Sorghum vulgare L.* fruit in paracetamol induced liver damage in Wistar rats.

Materials and methods

Preparation of *Sorghum vulgare L.*

Extract:

Sorghum vulgare L. fruits were collected from Tirupathi city in the month of July were identified and authenticated by Dr.Prof.k. Madhavasetty, Sri.Venkateshwara University and the herbarium (voucher No.) have been preserved at Bharathi College (km.doddi). Shade dried fruit pulp was powdered to moderately coarse grade. Methanolic extract of fruit pulp was obtained by using soxhlet extractor. The extraction was continued for 12 cycles or until the solvent in the thimble was clear. After evaporating the solvent, the greenish brown semisolid extract was kept in an air tight container at 400c for future use. Suspensions of extract were freshly prepared using 0.1% Tween 80, for experimental use^{4,6}.

Animals:

The complete course of the experiment was carried out using healthy adult male Wistar rats obtained from registered breeders and were maintained at the Animal House of the Institution. They were fed on commercial laboratory animal feed and tap water ad lib. The rats weighing between 120-150 g were housed for about a week for acclimatization with natural 12:12hr light – dark cycle. The animals were starved overnight with tap water ad lib prior to the day of experimentation. Ethical clearance was obtained from Institutional Animal Ethics Committee constituted as per CPCSEA guidelines^{5,8}.

Acute Toxicity Study:

Acute toxicity studies were carried out for all the extracts as per OECD guideline 425[8] in Swiss mice weighing 25 to 30gms by administering a dose 2000 mg/kg orally. The groups were almost continuously observed for mortality and behavioural changes during first 24hr and then daily for a fortnight. The oral LD₅₀ was found to be more than 2000mg/kg^{1,9}.

Drugs used and their Doses:

In first group (n=6, in each) of animals methanolic

extract of fruit pulp was administered with the dose of 200mg/kg b.w. Second group received Liv52 5ml/kg b.w [9], while third group received N-acetyl L-cystine (Lobe chem.)100mg/kg b.w., fourth group and fifth groups received equivalent volume of 1%CMC, Paracetamol 2gm/kg b.w in 1% CMC was administered to all groups except fifth group (Normal Control) on fifth day [10]. All the treatments were administered orally¹⁰.

Methodology:

All the treatments were given for a total period of 7days, on the eighth day all the rats were anaesthetized by ether to withdraw cardiac blood and the animals were sacrificed by overanesthesia to dissect out liver for histopathological studies. Blood was allowed to coagulate for 30 min and serum was separated by centrifugation at 2500 rpm, to estimate alanine aminotransferase (ALT), aspartate aminotransferase (AST), total protein and billirubin content ¹¹.

Statistical analysis:

The results were analysed by ANOVA followed by Tukey's multiple comparison test and $p \leq 0.05$ was considered as significant.

Results

The groups treated with Paracetamol alone (positive control) showed significantly elevated level of ALT, AST, billirubin and significantly decreased total protein contents compared to negative control (not challenged with paracetamol) animals. The animals treated with methanolic extract, Liv52 and Nacetyl L-cystine showed significant reduction in all the biochemical parameters. Methanolic extract, Liv52 though significantly lowered all the biochemical parameters as compared to only paracetamol treated group but failed to restore them to the normal level. In contrast, N- acetyls L-cystine restored the biochemical parameter to the

normal level.

see Table 1.

Discussion

Findings of the present study clearly indicate that methanolic extract of *Sorghum vulgare* showed significant Hepatoprotective activity against paracetamol induced hepatic injury. No similar reports could be traced in available literature. As expected N-acetyl L-cystine, a specific antidote for paracetamol hepatotoxicity totally restored the hepatic histology except sinus congestion. It is well known that N-acetyl L-cystine replenishes the glutathione stores of liver and prevents binding of the toxic metabolite to other cellular constituents, similarly Liv-52 which contains the various herbal plants mainly *Capparis spinosa*, *Cichorium intybus*, *Solanum nigrum*, *Terminalia arjuna*, *Cassia occidentalis* and *Achillea millefolium* shows the hepatoprotective activity by the virtue of their antioxidant property and this is due to the presence of flavanoids, cynogenic glycosides and triterpines^{12,13}. *Sorghum vulgare* fruit have been reported to contain flavanoids, sterol and glycosides in addition to alkaloids, tannins, saponnins etc. Hepatoprotection offered by *Sorghum vulgare* extract could be attributed to these constituents. Since antioxidants have been reported to posses Hepatoprotective activity [14]. The present study was not aimed to elucidate hepatoprotective mechanisms of *Sorghum vulgare* extract. In order to confirm their antioxidant potential and to identify various enzymes involved in generating oxygen free radicals further studies are essential.

Conclusions

From the Data of results obtained it is evaluated that the plant *Sorghum vulgare* possesses a significant hepatoprotective activity compare to the standard drug. The study also helped us to identify the therapeutic values of the common plants present around us.

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Treatment/groups	AST (IU/L) Mean ± SEM	ALT (IU/L)	Total protein (g/dl)	Bilirubin (mg/dl)	
				Total	Direct
Normal	146.1 ± 1.26	90.25 ± 1.25	7.59 ± 0.17	0.32 ± 0.02	0.13 ± 0.05
Paracetamol Control	216.1 ± 6.48 #	162.4 ± 2.40 #	3.94 ± 0.16 #	0.89 ± 0.02 #	0.18 ± 0.02 #
Methanolic Extract	158.3 ± 2.19***	128.3 ± 1.12***	5.68 ± 0.12***	0.75 ± 0.01***	0.14 ± 0.01***
Liv 52	140.8 ± 1.35***	133.3 ± 1.25***	5.60 ± 0.17***	0.79 ± 0.01***	0.13 ± 0.01***
N-acetyl LCystine	133.0 ± 2.42***	158.8 ± 1.79***	5.54 ± 0.15***	0.61 ± 0.02***	0.15 ± 0.01***

Table No.1: Effect of Sorghum vulgare in paracetamol induced Hepatotoxicity Biochemical Parameters

ANOVA: *** p<0.001 considered significant as compared to Paracetamol control group.

p<0.001 considered significant as compared to Normal control group