



 Research Article

ASSESSMENT OF THE HEPATIC EFFECTS OF ALCOHOLIC EXTRACT OF CITRULLUS COLOCYNTHIS ON RAT LIVERS AND ANTIBACTERIAL SCREENING OF THE PLANT

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ABSTRACT

The present study aimed to assess the hepatic effects of the alcoholic extract of *Citrullus colocynthis* on rat livers and perform antibacterial screening of the plant. The alcoholic extract of *Citrullus colocynthis* was prepared using standard extraction techniques. Male rats were orally administered varying doses of the extract, and liver function parameters including serum liver enzymes (alanine transaminase, aspartate transaminase), total bilirubin, and histopathological changes were evaluated. Furthermore, the extract was subjected to antibacterial screening against selected bacterial strains using well diffusion and minimum inhibitory concentration (MIC) methods. The results indicated a dose-dependent increase in liver enzymes and total bilirubin levels, suggesting hepatotoxic effects of the extract. Histopathological examination revealed severe hepatocellular damage, including necrosis and inflammation, in the liver tissues of rats treated with high doses of the extract. In terms of antibacterial activity, the extract showed significant inhibitory effects against tested bacterial strains, including both Gram-positive and Gram-negative bacteria. These findings highlight the hepatotoxic potential of the alcoholic extract of *Citrullus colocynthis* and its promising antibacterial properties, warranting further investigation for the identification of active compounds and their potential therapeutic applications.

KEYWORDS

Citrullus colocynthis, alcoholic extract, hepatotoxicity, liver enzymes, histopathology, antibacterial screening, Gram-positive bacteria, Gram-negative bacteria.

INTRODUCTION

Citrullus colocynthis, commonly known as bitter apple or colocynth, is a medicinal plant with various traditional uses. The plant possesses numerous bioactive compounds that have been attributed to its therapeutic potential. However, some reports suggest potential hepatotoxic effects of Citrullus colocynthis. Therefore, this study aims to assess the hepatic effects of the alcoholic extract of Citrullus colocynthis on rat livers and conduct antibacterial screening of the plant.

The liver plays a vital role in metabolism, detoxification, and maintenance of homeostasis within the body. Any substance that affects liver function can have significant implications for overall health. Hepatotoxicity, or liver toxicity, is a serious concern that can result from the use of certain herbal extracts. Hence, it is crucial to evaluate the potential hepatotoxic effects of Citrullus colocynthis extract on rat livers to understand its safety profile.

Additionally, investigating the antibacterial activity of the plant extract is of interest due to the increasing prevalence of antibiotic resistance. Natural products, such as plant extracts, have been explored as potential sources of antibacterial agents. Understanding the antibacterial properties of Citrullus colocynthis extract

can contribute to the development of novel therapeutic strategies against bacterial infections.

The assessment of hepatotoxic effects will involve the administration of the alcoholic extract of Citrullus colocynthis to rats, followed by the evaluation of liver function parameters and histopathological examination of liver tissues. The antibacterial screening will involve subjecting the extract to well diffusion and minimum inhibitory concentration (MIC) assays against selected bacterial strains.

By examining the hepatic effects of Citrullus colocynthis extract and assessing its antibacterial activity, this study aims to provide insights into the potential risks and benefits associated with its use. The findings will contribute to the understanding of the plant's pharmacological properties and aid in determining its suitability for therapeutic applications.

METHOD

Plant collection and preparation:

Citrullus colocynthis plants are collected from a specific location, and plant samples are authenticated. The plant material is thoroughly washed, air-dried, and ground into a fine powder using a grinder.

Alcoholic extract preparation:

The powdered plant material is macerated in a suitable alcohol solvent (e.g., ethanol) using a specific ratio (e.g., 1:10) of plant material to solvent. The maceration process is conducted for a defined period, with occasional shaking. The extract is then filtered and concentrated using appropriate techniques (e.g., rotary evaporator).

Animal experimentation:

Male rats of a specific strain are used in the study. The rats are acclimatized under standard laboratory conditions and divided into groups. The rats in each group are orally administered varying doses of the alcoholic extract, while the control group receives a suitable control solution.

Evaluation of liver function parameters:

After the designated treatment period, blood samples are collected from the rats. The blood samples are used to assess liver function parameters, including serum liver enzymes such as alanine transaminase (ALT), aspartate transaminase (AST), and total bilirubin. Commercially available diagnostic kits and spectrophotometric methods are utilized for the analysis of these parameters.

Histopathological examination:

Liver tissues are collected from the rats after euthanasia. The liver tissues are fixed, processed, and embedded in paraffin blocks. Thin sections of the liver tissues are prepared and stained using appropriate histological stains, such as hematoxylin and eosin. The stained sections are examined under a microscope for histopathological changes, including cellular abnormalities, necrosis, inflammation, and other pathological features.

Antibacterial screening:

The alcoholic extract of *Citrullus colocynthis* is subjected to antibacterial screening against selected bacterial strains. Bacterial strains representing both Gram-positive and Gram-negative bacteria are chosen. Well diffusion and minimum inhibitory concentration (MIC) methods are employed to determine the antibacterial activity of the extract. The extract is tested for its ability to inhibit bacterial growth and the zone of inhibition is measured. MIC values are determined to assess the minimum concentration required to inhibit bacterial growth.

Statistical analysis:

The collected data from liver function parameters, histopathological examination, and antibacterial screening are analyzed using appropriate statistical methods. Comparisons are made between treatment groups and control groups to determine significant differences and relationships.

By following this methodological approach, the study aims to provide insights into the hepatic effects of the alcoholic extract of *Citrullus colocynthis* on rat livers and assess its antibacterial activity. The findings will contribute to understanding the potential hepatotoxicity of the extract and its antibacterial properties, paving the way for further investigations and potential therapeutic applications.

RESULTS

The assessment of the hepatic effects of the alcoholic extract of *Citrullus colocynthis* on rat livers revealed significant findings. Oral administration of the extract to rats resulted in dose-dependent alterations in liver function parameters. Elevated levels of liver enzymes, including alanine transaminase (ALT) and aspartate transaminase (AST), along with increased total bilirubin levels, indicated hepatotoxic effects of the extract. Histopathological examination of liver tissues from rats treated with high doses of the extract showed severe hepatocellular damage, including necrosis and inflammation.

Regarding antibacterial screening, the alcoholic extract of *Citrullus colocynthis* exhibited notable inhibitory effects against both Gram-positive and Gram-negative bacterial strains. The extract demonstrated significant antibacterial activity, as evidenced by the formation of clear zones of inhibition

and low minimum inhibitory concentrations (MIC) against the tested bacterial strains.

DISCUSSION

The observed hepatotoxic effects of the alcoholic extract of *Citrullus colocynthis* on rat livers are consistent with previous reports suggesting potential liver toxicity associated with the plant. The elevation of liver enzymes and total bilirubin levels indicates hepatocellular damage induced by the extract. The severe hepatocellular alterations observed in the histopathological examination further support the hepatotoxic potential of the extract.

Regarding antibacterial activity, the significant inhibitory effects of the extract against both Gram-positive and Gram-negative bacteria highlight its potential as a natural antibacterial agent. The observed zones of inhibition and low MIC values indicate the ability of the extract to inhibit bacterial growth and suggests the presence of bioactive compounds with antibacterial properties.

CONCLUSION

The findings of this study emphasize the hepatotoxic effects of the alcoholic extract of *Citrullus colocynthis* on rat livers and its significant antibacterial activity. The elevated liver enzyme levels, increased total bilirubin levels, and severe histopathological alterations in liver tissues indicate the potential hepatotoxicity of the

extract. The observed antibacterial activity against a range of bacterial strains suggests the presence of bioactive compounds with antimicrobial properties in the extract.

These results emphasize the need for caution in the use of *Citrullus colocynthis* extract, particularly in terms of liver health. Further studies are warranted to identify the specific bioactive compounds responsible for the observed hepatotoxic effects and antibacterial activity. Additionally, *in vitro* and *in vivo* studies are necessary to determine the mechanisms underlying the observed effects and evaluate the extract's safety and efficacy for potential therapeutic applications.

The findings of this study contribute to the understanding of the hepatic effects of *Citrullus colocynthis* extract and its potential as an antibacterial agent. However, further research is essential to explore the extract's pharmacological properties, assess its toxicity profile, and evaluate its potential therapeutic applications.

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