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Hepatoprotective effect of ethanolic extract of sugarcane (*Saccharum officinarum* Linn.) leaves

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Abstract

Objectives: The sugarcane leaf is rich in phytochemical content. It is rarely used because it is a waste although it has potential activity as antimutagen, anti-inflammation, and antioxidant. There is no study about its hepatoprotective activity yet. This study was conducted to determine the hepatoprotection of sugarcane leaves in tested animals with liver acute injury induced by carbon tetrachloride (CCl₄).

Methods: Twenty-four Wistar strain rats were divided into three groups of experimental animals (dose 300, 400, and 500 mg/kg) and three control groups (normal, positive, and negative). The ethanol extract of sugarcane leaves obtained from Panti, Jember, was made using the maceration method. The animals were treated for 14 days by giving the extract to the treatment group. One hour after treatment on the last day, the test animals were given CCl₄ intraperitoneally except for the normal group. On the 15th day, the blood of the test animal was taken to be tested for the biochemical value of the liver (aspartate transaminase (AST), alanine aminotransferase (ALT), alanine phosphatase (ALP), and bilirubin) and examined for its liver to be made histological preparations.

Results: The results showed that the treatment with a dose of 500 mg/kg was able to decrease AST, ALT, ALP, and bilirubin parameters compared to the negative control. The extract also provided improvements in liver tissue histology compared to the negative control.

Conclusions: Sugarcane leaf ethanol extract (SCLE) has a potential hepatoprotective effect.

Keywords: CCl₄; ethanolic extract; hepatoprotective; rat; sugarcane leaves.

Introduction

Liver disease causes the death of around two million people every year worldwide. Cirrhosis and liver cancer contribute to 3.5% deaths worldwide. Hepatitis B virus (HBV), hepatitis C virus (HCV), alcoholic liver disease (ALD), nonalcoholic fatty liver disease (NAFLD), and cirrhosis related hepatocellular carcinoma are several diseases linked to the liver [1]. Indonesian Ministry of Health states that in 2018 the incidence of hepatitis was 0.39% that spread equally to any age, gender, occupation, and residency [2]. Deaths from hepatocellular carcinoma rank fourth of cancer mortality in Indonesia after lung, breast, and cervix uteri [3].

The liver plays a role in the process of metabolism and detoxification of metabolites or xenobiotics that enter the body [4]. Metabolites or xenobiotics or other agents such as viruses or certain chemicals or free radicals such as reactive oxygen species (ROS) could damage liver cells that result in liver cirrhosis, hepatitis, and liver cancer [5]. Toxic metabolites such as free radicals ROS can trigger an immune response to or have a direct effect on cell biochemistry by damaging the macromolecular structure of liver cells [6]. Carbon tetrachloride (CCl₄) is an example of a hepatotoxin that is often used to induce fibrosis and cirrhosis of the liver because its metabolites are free radicals [6, 7]. The metabolic product of CCl₄ is trichloromethyl free radicals, which cause oxidative stress by binding to cellular molecules like nucleic acids, protein, and fat. Those will affect DNA synthesis and damage cellular processes causing lipid peroxidation, cell damage, apoptosis, necrosis, inflammation, fibrosis, and malignancy [8, 9].

One of the hepatoprotective ways is to strengthen antioxidant capacity by increasing the number of oxidants in the body, one of which is the intake of antioxidants from outside [4]. Numerous medicinal plants have been

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