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Hepatoprotective Effects of the M-1 Bioactive Supplement in Acute Toxic Hepatitis Induced by Ccl4 in Mice

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Relevance: Liver diseases, particularly toxic hepatitis, remain a major global health concern due to their high morbidity and mortality rates. Exposure to hepatotoxins such as carbon tetrachloride (CCl4) can lead to severe liver damage, necessitating the development of effective hepatoprotective agents. Despite advancements in medical therapy, there is still a need for natural or bioactive compounds that can mitigate liver injury. The M-1 bioactive supplement has shown potential hepatoprotective properties, yet its efficacy needs thorough scientific validation. Animal models are widely used to investigate the therapeutic potential of bioactive compounds against chemically induced liver toxicity. The current study aims to evaluate the hepatoprotective effects of M-1 in an experimental model of acute toxic hepatitis. The findings of this study could contribute to the development of new strategies for liver disease management.

Objective: To investigate the hepatoprotective activity of the M-1 bioactive supplement in mice with acute toxic hepatitis induced by CCl4 and to determine the optimal dosage for its protective effects.

Materials and Methods: The study was conducted on male white laboratory mice weighing approximately 20±2 g. The animals were kept under standard vivarium conditions with free access to food and water. Acute toxic hepatitis was induced by administering CCl4 at a hepatotoxic dose, diluted 1:1 with olive oil, to prevent direct tissue injury. Mice were divided into five groups: (I) healthy control, (II) negative control (CCl4 + water), (III) CCl4 + 5 ml/kg M-1, (IV) CCl4 + 10 ml/kg M-1, and (V) CCl4 + 15 ml/kg M-1. The M-1 supplement was administered orally for five consecutive days. The hepatoprotective effect was assessed using parameters such as survival rate, liver weight coefficient, body weight dynamics, and general physiological observations. The hepatoprotective efficacy was determined by calculating the Hepatoprotective Activity Coefficient (HAC). Statistical analysis was performed using Microsoft Excel, with differences considered significant at $p<0.05$.

Results: The survival rate in the control group was 100%, whereas the CCl4-treated group showed a significant mortality rate of 66.7%. The administration of 10 ml/kg M-1 resulted in the highest survival rate among treated groups (83.3%) and a prolonged lifespan of 5.8 days compared to the negative control. The liver weight coefficient in the 10 ml/kg M-1 group significantly decreased compared to the negative control, indicating reduced hepatic injury. The body weight of mice treated with M-1 at 10 ml/kg showed a positive trend, suggesting improved health status. The

Hepatoprotective Activity Coefficient (HAC) was highest for the 10 ml/kg dose, classifying it as highly effective, while the 15 ml/kg dose exhibited moderate hepatoprotective activity. Histopathological analysis demonstrated reduced hepatic necrosis and inflammatory infiltration in M-1-treated groups, confirming its protective potential.

Conclusions: The study confirmed the hepatoprotective efficacy of the M-1 bioactive supplement against CCl4-induced toxic hepatitis in mice. Among the tested doses, 10 ml/kg showed the most significant protective effect, with increased survival, improved physiological parameters, and reduced liver injury. The findings suggest that M-1 could be a promising natural hepatoprotective agent for preventing toxin-induced liver damage. Further studies are necessary to elucidate its molecular mechanisms and potential clinical applications.

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