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Predictive Factors for Hepatic and Renal Toxicity among Patients with Acetaminophen Poisoning

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ABSTRACT

Introduction: Acetaminophen poisoning is one of the most critical drug overdoses that can lead to death. In the United States, acetaminophen poisoning annually results in 500 deaths, 100,000 poison control center calls, and 50,000 emergency room visits. The most significant complications include hepatic and renal toxicity. This study aimed to evaluate the predictive factors for hepatic and renal toxicity.

Methods and Materials: This cross-sectional study was conducted in the poisoning department of Khorshid Educational and Medical Hospital, Isfahan. From December 2020 to December 2020, patients over 18 years old who were poisoned with acetaminophen and had their poisoning diagnosed based on registered medical records were examined. Out of 2,878 poisoned patients, 146 were diagnosed with acetaminophen poisoning. Patients were assessed for hepatic (ALT and AST increase) and renal toxicity (Cr increase), with liver and kidney function tests conducted three times during hospitalization (upon arrival, about 24 hours later, and 48 hours later). Data were analyzed using SPSS 23 software, employing t-tests and chi-square tests, with p-values 0.05 considered statistically significant.

Results: The mean age of the patients was 27.48 ± 8.92 years, and 81.1% had intentional acetaminophen poisoning. Among these, 26.7% developed renal toxicity, 15.1% hepatic toxicity (elevated AST), and 11.6% hepatic toxicity (elevated ALT Renal toxicity was more common in females, while hepatic toxicity with elevated AST was more frequent in females and elevated ALT in males. There was a significant association between the type of poisoning (intentional or accidental) and renal toxicity (p = 0.05). The amount of acetaminophen consumed was a strong predictor of hepatic toxicity (p = 0.05). Specifically, for each gram increase in acetaminophen, the odds of elevated AST increased by 13% (OR = 1.13; p = 0.03) and elevated ALT by 15% (OR = 1.15; p = 0.02). Additionally, each gram increase in acetaminophen raised the likelihood of recovery by 12% (OR = 1.12). The area under the curve (AUC) has a significant relationship with the amount of acetaminophen and the likelihood of hepatic toxicity (AST and ALT; p = 0.05). The cut-off point for the increase in AST and ALT was determined to be 6.75 grams of acetaminophen. The specificity of AST and ALT is 0.57, while the sensitivity of AST is 0.62, and the sensitivity of ALT is 0.67.

Conclusion and Discussion: The amount of acetaminophen consumed is a significant predictor of hepatic toxicity, although it did not show a meaningful relationship with renal toxicity. The findings from this study can be presented to doctors so that they can guess which of the possible cases are important. This clinical vision will lead to early treatment and reduction of complications and economic burdens and provide valuable insights for physicians to identify patients at risk of severe complications such as hepatic and renal toxicity.

Keywords: Acetaminophen, Cross-sectional study, Poisoning