

The Effects of Tannic Acid to the Cadmium Toxicity on Mouse

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ABSTRACT

Tannic acid (0.5mg/ml, 1.0mg/ml, 2.0mg/ml)와 카드뮴(20mg/kg)을 마우스에 경구 투여한 결과는 다음과 같다. 1. Tannic acid와 카드뮴을 투여한 마우스의 증체량과 음식소비량에 변화가 있었으나, 카드뮴투여에 의한 변화는 tannic acid투여에 의하여 감소되었다. 2. 카드뮴투여에 의하여 간장의 상대중량과 뇌 상대중량이 대조군에 비하여 유의한 변화가 있었으며, tannic acid 1.0mg/ml 투여군에서는 간장의 상대중량, 폐장의 상대중량, 흉선의 상대중량도 유의하게 변화하였다. ($P<0.05$) 3. Hemoglobin contents, packed cell volume, platelet count, neutrophill count 등의 혈액학적인 변화는 대조군에 비하여 카드뮴투여군에서 유의한 변화가 인정되었다. 그러나, 이러한 유의한 변화가 tannic acid를 동시 투여한 군에서는 나타나지 않았다. 4. 카드뮴을 투여한 군에서는 혈청학적 변화(ALT, AST, BUN와 creatinine)가 있었으나 tannic acid 0.5, 1.0, 2.0mg/ml을 동시투여한 군에서는 회복되는 경향이 나타났다. 위의 결과로 미루어 카드뮴 투여에 의한 독성이 tannic acid을 2.0 mg/ml/day 이상 4주간 투여하였을 때 경감효과가 나타날 수 있었다. 그러나, 카드뮴과 같은 중금속의 독성에 tannic acid가 어떻게 경감효과를 나타내는지에 관한 작용기전의 연구가 더 필요할 것으로 사료된다.

Key words : tannic acid, cadmium, mouse

I. INTRODUCTION

Tannins occur naturally in relatively abundant amounts in fruits, herbal medicines and common beverages. Tannic acids (TA) has numerous chemical, food and pharmacological application. TA, a polyphenolic protein-denaturing

agent, has been reported to reduce allergen levels in house dust and is marketed for that purpose as 1% and 3% solution in USA. Also, TA was shown to reduce oxygen to superoxide anion and has neither carcinogenicity potential in F344 rats nor modifying effects on spontaneous tumor development.

The usual sources of cadmium for the general population are mainly food and inhaled tobacco smoke. Among foods, the usual concentration is less than 0.1µg/g wet weight. Sources of cadmium in foods and other environmental media generated by man are not clearly defined. Chronic inhalation and oral exposure to cadmium have the same target organ : the kidney. The kidneys are susceptible to cadmium toxicity because cadmium accumulates in the kidneys.

Tannic acid was generally exposed by ingestion and be a expecting material for reducing the toxicity of heavy metals by screening of absorption in intestinal tracts and by forming insoluble salts be facilitate to excrete in the guts. The present study was conducted to determine the role of tannic acid pretreatment to the cadmium toxicity in mouse.

II. MATERIALS AND METHODS

This experiments were accomplished in the laboratory of environmental hygiene located in Yongin University, and experimental animal were supplied by National Toxicology Institute. The experimental animal (ICR SPF mouse) used to the study after acclimatized to the laboratory environment for 1 week.

Solutions of CdCl₂(Sigma Co.) were prepared by dissolving the metal salt in distilled water and, the solutions of tannic acid were prepared according to the method of Kim. Mice were administered with 0.5, 1.0, 2.0mg/ml as tannic acid by bottled solution *ad libitum*. Also mice were

administered with 20mg/kg/day as cadmium by oral gavage for 4 weeks.

Body weights change were recorded by 1 time/week, water consumptions were recorded by 2 times/week.

Mice were fasted for 24 hours before autopsied, and were killed by cervical dislocation and sampled whole blood in EDTA-Na treated bottle for analyzed WBC count, RBC count, HGB contents, PCV, platelet count, lymphocyte count and neutrophile count by using Technicon H1 system. Supernatants (serum) were collected for biochemical analysis (Technicon RA-XT) alanine aminotransferase (ALT), aspartate aminotransferase (AST), creatinine, blood urea nitrogen (BUN).

III. RESULTS

Body weight gain of cadmium treated group were significantly decreased ($p < 0.05$) compared with control group on the day 7th, 14th, 21st and 28th of treatment. Body weight of tannic acid combined treated group except tannic acid 1.0mg/ml combined treated group were recovered to extent of the control group's.

Relative weight of liver and brain of cadmium treated group were increased significantly compared with control group ($P < 0.05$). Relative weight of liver, lung and thymus of cadmium and tannic acid 1.0 mg/ml treated group were increased significantly compared with control ($P < 0.05$). But, there were no significant change of organ weight on cadmium and tannic acid 0.5 or 2.0 mg/ml treated group.

Hemoglobin contents, packed cell volume and platelet count of cadmium treated group were decreased significantly compared with control group ($P < 0.05$). And the neutrophil count of cadmium treated group was increased significantly compared with control group ($P < 0.05$). But, there was no significant change in the tannic acid treated groups.

ALT and AST activity, BUN and creatinine contents were increased significantly in the cadmium treated mouse compared with control group. These changes were attenuated by the tannic acid administration.

The tannic acid has some possible alleviative effects of cadmium toxicity upto the 2.0 mg/ml/day of oral dose for 4 weeks. But we need further study of mechanism for toxicity alleviating action of tannic acid to the heavy metals like cadmium. A combination study of the principle action mechanism to the cadmium induced metallothionein will be necessary, as each of them appears to exert alleviative effect of cadmium toxicity, one will also need to check for direct chemical action or indirect chemical action may be occurring.

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