환위 24

제 목	국 문	한국 된장에 의한 Aflatoxin 감소 및 세포 독성과 생식 독성에 미치는 영향			
	영 문	Reduction of Aflatoxins by Korean Soybean Paste and its Effect on Cytotoxity and Reproductive Toxicity—Part 4.			
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1. 연구목적

The objectives of this work were to: (1) determine the effect of the extract of Korean soybean paste (doen-jang) on mold growth and aflatoxin production, and identify the main active component, (2) study the genetic toxicity of methanol extract of Korean soybean paste, and its antigenotoxic effect on aflatoxin B_1-induced bacterial reverse mutation and chromosome aberration, and (3) investigate the potential of Korean soybean paste in reducing and preventing the aflatoxin toxicity in laying hens.

2. 연구방법

A home-made Korean traditional soybean paste was used for this study. The soybean paste was prepared from fermented meju cakes. All of the preparation methods for soybean paste followed the recommendations of the Korea Food Research Institute. The inhibitory effect of methanol extract of Korean soybean paste on the mold growth and aflatoxin production of a toxigenic strain of *Aspergillus parasiticus* ATCC 15517 was studied using different concentrations of the extract in yeast-extract sucrose broth. To investigate the genotoxicity of the methanol extract of Korean soybean paste and its antigenotoxic activity against aflatoxin B_1, bacterial reverse mutation assay with *Salmonella typhimurium* TA1535, TA1537, TA98, TA100, and TA102, and in vitro chromosome aberration assay with Chinese hamster lung cells were performed. An experiment was conducted on the effects of Korean soybean paste (0.5%, 1%, and 5%) on the toxicity of 500 ppb of aflatoxin in diet of sixty laying hens (Isa Brown) divided into five groups and treated from week 15 to week 67.

A biochemical autoanalyzer and regents (Hitachi 747, Japan) were used according to the manufacture's recommended procedure for analysis of the biochemical parameters in the serum samples of hens. Pieces of the organs of hens were taken and fixed in 10% neutral buffered formalin for histological examination. Paraffin sections were made and stained with hematoxylin-eosin, then examined by microscope (Nikon HFX-Ⅱ, Japan). The aflatoxin content in samples was determined using direct competitive ELISA kits, Veratox®, and a Microwell Reader (NEOGEN, Lansing, MI).

3. 연구결과

Reduction of mycelial weight as a result of addition of the extract was observed to range between 1.5 to 12.9% while reduction of aflatoxin production ranged from 14.3 to 41.7%. Five percent of the extract significantly reduced aflatoxin production at the end of the incubation period ($p<0.05$) although the effect on mycelial growth was less pronounced. The main active component identified by GC-Mass was linoleic acid. The methanol extract revealed nonmutagenic potential in all the bacterial strains tested. The extract significantly reduced the numbers of revertants per plates when it was added to the assay system using *S. typhimurium* TA100 ($p<0.05$). The extract also exhibited significant inhibitory effects on chromosome aberration in Chinese hamster lung cells ($p<0.05$). The treatment of aflatoxin resulted in many deleterious effects, especially significantly severely altered cell foci and sinusoid dilatation in the livers, compared with the control. The feeding of 1% soybean paste reduced the adverse effects of the aflatoxin on the body weight, relative organ weights, egg production, and aflatoxin accumulation in eggs, and improved serum calcium and ALT levels, and the histopathological lesions of the livers. The feeding of 5% soybean paste showed the same improvement at a higher level especially in the histopathological findings of livers.

4. 고찰

This study indicates that soybean paste could also be an effective inhibitor of aflatoxin production even though mycelial growth may be permitted. The findings of this work indicate that the methanol extract of Korean soybean paste could have a strong potential as an antigenotoxic material. On the basis of body weight, relative organ weights, aflatoxin accumulation in eggs, serum biochemical values and enzyme activities, and histological findings of the livers, it was suggested that 5% and sometimes only 1% Korean soybean paste in the diet protected laying hens from the major deleterious effects of 500 μg of aflatoxin/kg of diet. These results suggest that Korean soybean paste has a protective effect on the reduction of aflatoxin toxicity.