

고지방식을 섭취시킨 C57BL/6 마우스에서 도라지의 항비만 및 지방간 억제 효과

노정란, 강길태, 문지선, 김용훈, 양금진, 서지희, 김상겸¹, 이철호, 이현선*한국생명공학연구원, ¹충남대학교**Anti-obesity and Fatty Liver Inhibition Effects of Total Extract and Its Saponin Fraction of *Platycodon grandiflorum* in High Fat-fed C57BL/6 Mice**Jung-Ran Noh, Gil-Tae Gang, Ji-Sun Moon, Yong-Hoon Kim, Hee Hee Seo, Sang Kyum Kim¹, Chul-Ho Lee, Hyun-Sun Lee*Korea Research Institute of Bioscience and Biotechnology (KRIBB), ¹College of Pharmacy and RCTCP, Chungnam National University**Objectives**

The root of *Platycodon grandiflorum* (PG) has been known to have wide range of health beneficial effects such as anti-inflammatory action, hyperlipidemia and diabetes in traditional medicine in Korea. The present study was carried out to investigate the effects of PG on fatty liver inhibition effect in high fat diet (HFD)-fed C57BL/6 mice.

Materials and Methods

Male, 8 week-old C57BL/6 mice were randomly divided into four groups (n=10 per group); HFD plus daily vehicle (0.5% CMC) as control group, HFD plus xenical (50 mg/ml), HFD plus total extract of PG (T-PG, 500 mg/kg) and HFD plus saponin fraction (S-PG, 50 mg/kg). T-PG, S-PG and xenical were daily administered by oral gavage for 12 weeks. Body weight, fat mass, liver lipid contents and histopathology, lipid metabolism-related enzyme activities were assessed in all groups.

Results

The rates of body weight increase were significantly decreased in T-PG (44±4%) and S-PG (41±4%)($p<0.05$), compared to control mice (54±5%). Also, the relative fat masses (inguinal, abdominal) to body weight were decreased in T-PG (2.9±0.4%, 4.7±0.4%) and S-PG (3.0±0.4%, 4.9±0.3%) groups than those of control group (4.0%, 5.2%), respectively (Fig. 1), which indicated that body weight decreases in T-PG and S-PG treated mice were due to fat mass reductions rather than other factor changes such as muscle and bone mass. This was supported with the decreased plasma leptin levels in T-PG (5.76±0.9 ng/ml) and S-PG (7.88±1.4 ng/ml) groups, compared to control group (13.41±2.6 ng/ml) as well. Although there were no significant changes, plasma triglyceride and total cholesterol levels were reduced T-PG and S-PG-treated mice (Fig. 2). Meanwhile, the liver triglyceride contents were determined as about 37% and 16% less in T-PG, and S-PG groups than control, and liver cholesterol

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levels showed a similar reduction as shown in Fig. 3. By a light microscopy on liver tissue, severe fatty liver findings were observed in control mice, while T-PG and S-PG groups showed the distinct inhibition of fatty liver changes (Fig. 4). In addition, in comparison with fatty acid synthase (FAS) and carnitine palmitoyltransferase (CPT) in livers of T-PG and S-PG groups showed suppressed FAS and increased CPT activities than those control groups (Fig. 5), suggesting that PG inhibited the fatty acid synthesis and increased β -oxidation instead. Through all assessments, the similar result were observed in xenical-treated group.

Conclusion

Through the present study, it was concluded that PG had shown the anti-obesity effect by fat mass reduction and fatty liver prevention along with FAS and CPT activity modulation in HFD-fed C57BL/6 mice.

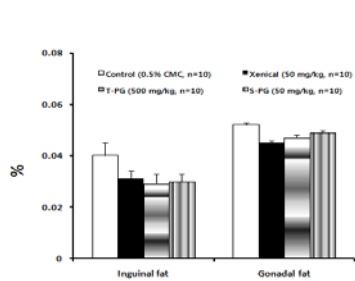


Fig. 1. Relative fat mass to body weight

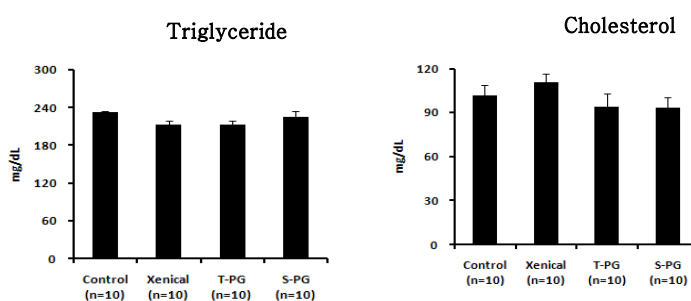


Fig. 2. Plasma Triglyceride & total cholesterol levels

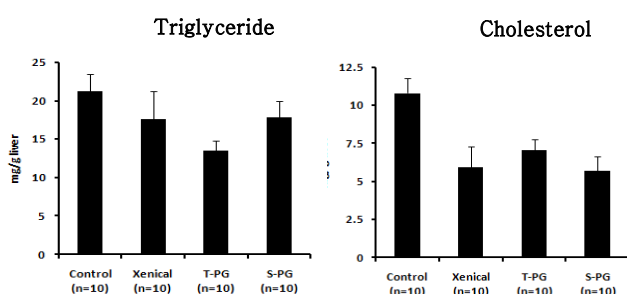


Fig. 3. Hepatic triglyceride and total cholesterol levels

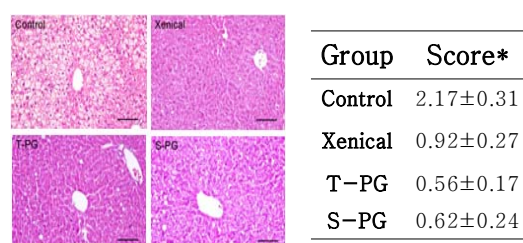


Fig. 4. Representative histological findings of liver fatty changes. H&E stain, x200, bar=100 μ m,

*: Score was calculated from fatty change grading (0-4) and represented as mean \pm SE

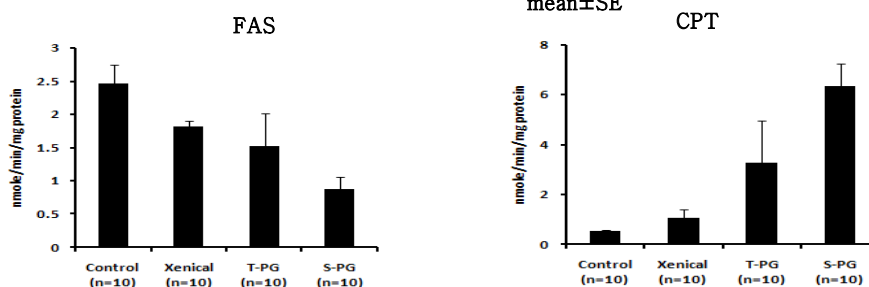


Fig. 5 Hepatic fatty acid synthase and carnitine palmitoyltransferase activities