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Utilization of chicken by-products: Gizzard inner lining extracts for injury protection to gastric mucosal cells (#438)

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Introduction

In the classical Chinese medicine book Compendium of Materia Medica, the chicken gizzard inner lining (GIL) is referred to as the "endothelium corneum gigeriae galli," which is purported to help maintain the integrity of stomach lining. However, because these supposed effects of GIL are not scientifically reported, studies are required to assess and demonstrate these effects.

Methods

In this study, GIL extracts were prepared for the purpose of obtaining protein. These extracts were subjected to a cell viability assay with a rat gastric mucosal cell line and wound healing assay following injury conditions induced by indomethacin. Moreover, the effects of GIL extracts on cyclooxygenases (COX)-1 and COX-2 levels in indomethacin-injured cells were investigated.

Results

Effects of the GIL protein extract on RGM-1 cell injury induced by indomethacin

The GIL protein extracts have the potential to increase the viability of indomethacin-injured cells (Figs. 1A and 1B), and the GIL extract is potentially useful for the alleviation of gastric injury. Thus, the GIL protein extracts were also expected to have other effects, such as enhancing the motogenic activity in the injured cell.

Effects of GIL protein extract on wound healing in RGM-1 cells

The GIL protein extracts induced high motogenic activity in RGM-1 cells following injury by indomethacin (Fig. 2); this result is consistent with that for RGM-1 cell viability in injury induced by indomethacin (Fig. 1B). Thus, GIL extract was suggested to affect the enhancement of RGM-1 cell migration as well as positively affect cell viability after injury by indomethacin.

Effects of GIL protein extract on COX-1 and COX-2 gene expression in indomethacin-injured RGM-1 cells

From the results of COX-1 and COX-2 gene expression in this study, COX-2 levels were found to be elevated by injury with indomethacin and the GIL protein extracts reduced COX-2 expression and COX-2/COX-1 intensity. Thus, COX-2 expression was also confirmed to be a useful indicator of the extent of inflammation following injury by indomethacin, and GIL protein extract was suggested to downregulate COX-2 expression of RGM-1 cells (Figs. 3A and 3B).

Conclusion

This study suggested that GIL protein extracts effectively recover RGM-1 cell viability following injury by indomethacin. In addition, the extracts also encouraged RGM-1 cell migration in a wound healing assay. These effects were believed to be primarily caused by the GKN-1 protein present in the GIL extract. Moreover, it was suggested that treatment with GIL extracts resulted in the downregulation of COX-2 expression in indomethacin-injured cells. In summary, GIL extracts can be a useful food material or supplement for protection against gastric inflammation.

Notes

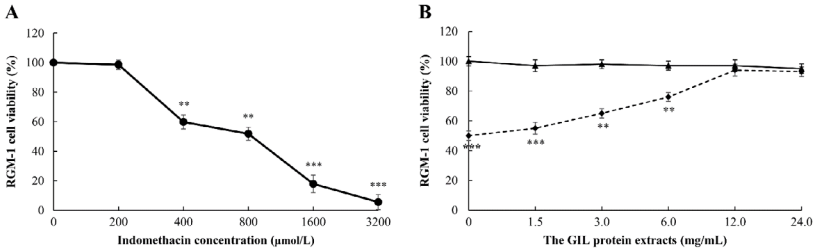
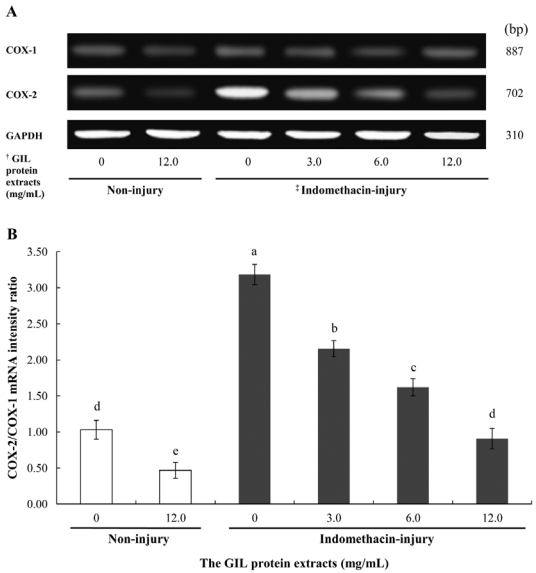


Fig. 1: Effects of GIL protein extracts on the indomethacin-injured RGM-1 cells

A shows analysis of tolerance of RGM-1 cells to indomethacin by MTT assay.B shows the protective effect of GIL against indomethacin-induced RGM-1 cell cytotoxicity by MTT assay.
—▲—: RGM-1 cells with different concentrations of GIL protein extracts;---◆---: RGM-1 cells treated with different concentrations of GIL protein extracts with injury induced via 800 μmol/L indomethacin.

Notes



Migration proportion (%) was estimated by measurement of cell migration acreage within the wounded r

A shows COX-1 and COX-2 mRNA expression in the injured RGM-1 cells treated with GIL protein extract in RT-PCR. †GIL protein extracts (mg/mL): RGM-1 cells treated with different concentrations of GIL protein extracts; ‡ Indomethacin injury: Injury was induced in RGM-1 cells by addition of 800 μmol/L indomethacin.
B shows the solid columns indicate the data of RGM-1 cells with injury induced. The hollow columns indicate the data of non-injured cells.

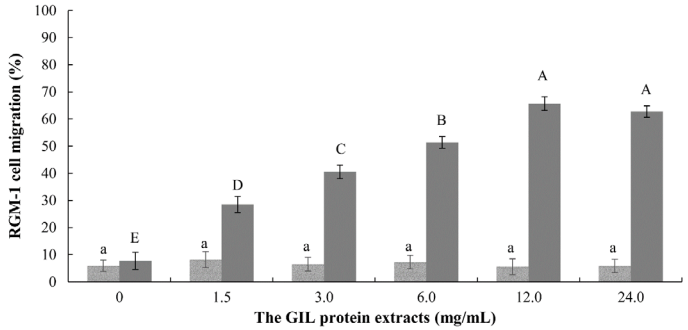


Fig. 2: Elevation of migration ratio in the indomethacin-injured RGM-1 cells by GIL protein extracts

Migration proportion (%) was estimated by measurement of cell migration acreage within the wounded region for 24 h as compared with negative controls (mosaic histogram) and GIL protein extracts (gray histogram).

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