

Article

Deciphering the Antitussive, Expectorant, and Anti-Inflammatory Potentials of ShashamKyeongok-go and Their Phytochemical Attributes: In Vivo Appraisal in ICR Mice

Jin-Ryul Hu ¹, Chul-Jong Jung ², Seong-Min Ku ², Dae-Hwa Jung ³, Sae-Kwang Ku ^{1,4}, Md. Mohibbullah ⁵, Hae-Jeung Lee ^{6,*} and Jae-Suk Choi ^{7,*}

- ¹ Department of Histology and Anatomy, Daegu Haany University, Gyeongsan-si, Gyeongsangbuk-do 38610, Korea; jinlyul@gmail.com (J.-R.H.); gucci200@hanmail.net (S.-K.K.)
- ² Okchundang Inc., Ulju-gun, Ulsan 44900, Korea; okchundang300@gmail.com (C.-J.J.); qltkd71@hanmail.net (S.-M.K.)
- ³ Department of Pharmaceutical Engineering, Daegu Haany University, Gyeongsan, Gyeongsangbuk-do 38610, Korea; jdh8024@hanmail.net
- ⁴ The Medical Research Center for Herbal Convergence on Liver Disease, Daegu Haany University, Gyeongsan-si, Gyeongsangbuk-do 38610, Korea
- ⁵ Department of Fishing and Post Harvest Technology, Sher-e-Bangla Agricultural University, Dhaka 1207, Bangladesh; mmohib.fph@sau.edu.bd
- ⁶ Department of Food and Nutrition, Gachon University, 1342 Seongnamdaero, Sujeong-gu, Seongnam, Gyeonggi 13120, Korea
- ⁷ Department of Food Biotechnology, Silla University, Sasang-gu, Busan 46958, Korea
- * Correspondence: skysea@gachon.ac.kr (H.-J.L.); jsc1008@silla.ac.kr (J.-S.C.); Tel.: +82-31-750-5968 (H.-J.L.); +82-51-248-7789 (J.-S.C.)

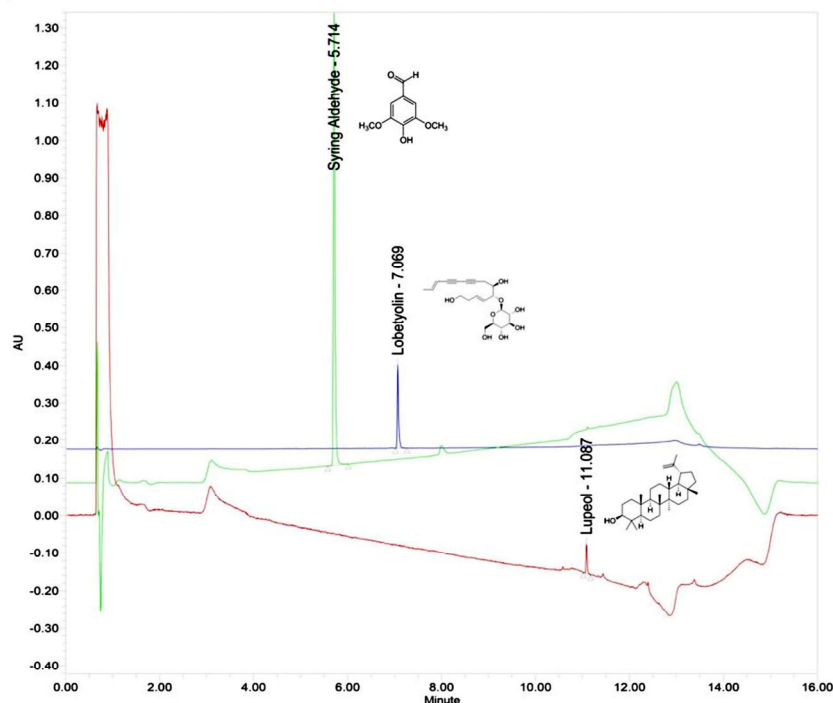
Citation: Hu, J.-R.; Jung, C.-J.; Ku, S.-M.; Jung, D.-H.; Ku, S.-K.; Mohibbullah, M.; Lee, H.-J.; Choi, J.-S. Deciphering the Antitussive, Expectorant, and Anti-Inflammatory Potentials of ShashamKyeongok-go and Their Phytochemical Attributes: In Vivo Appraisal in ICR Mice. *Appl. Sci.* **2021**, *11*, x. <https://doi.org/10.3390/xxxxx>
Received: 16 December 2020
Accepted: 28 January 2021
Published: date

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

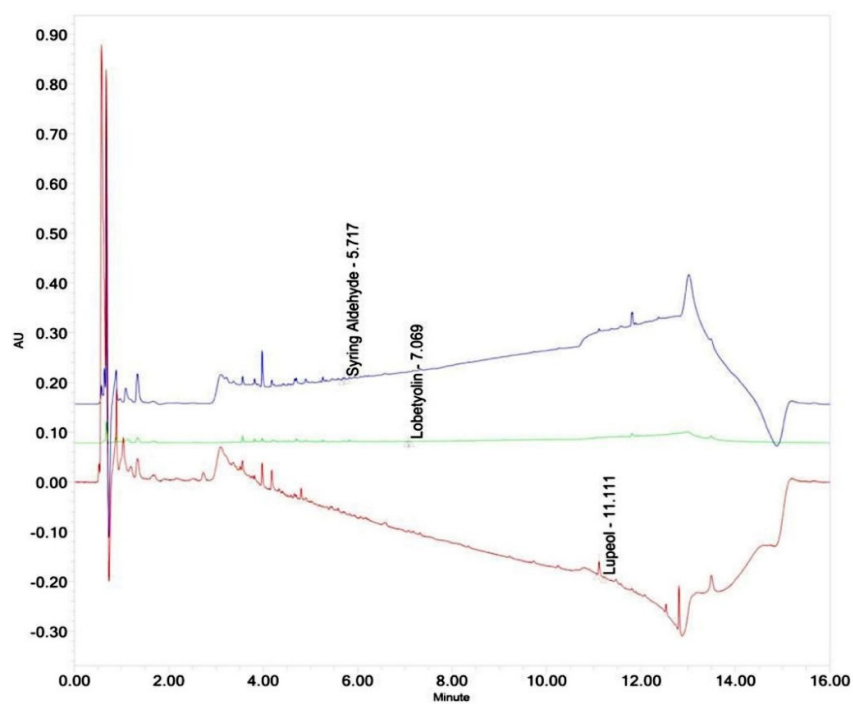


Copyright: © 2021 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

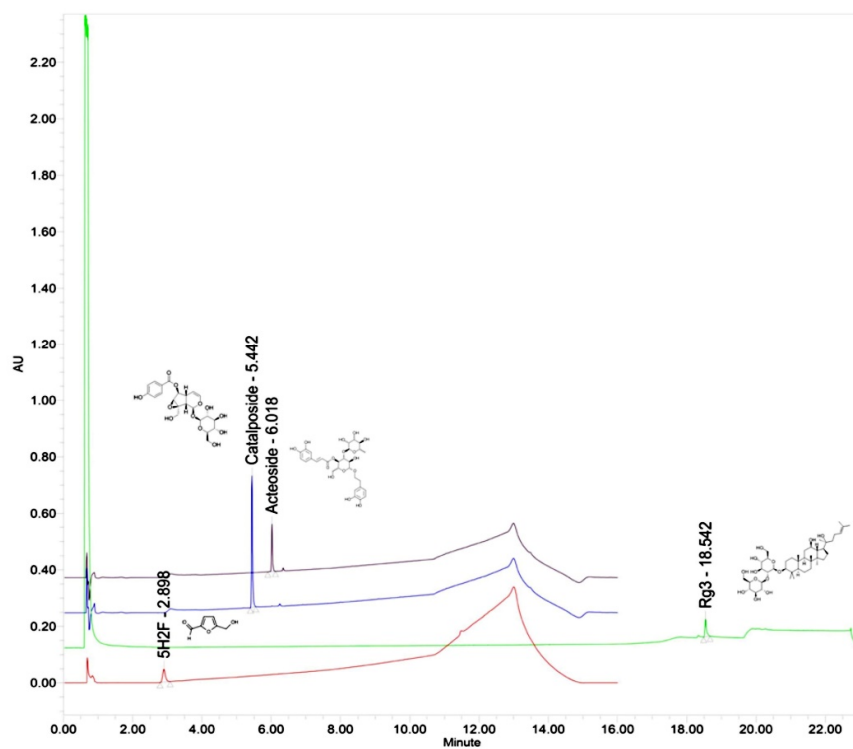
(A) Standard for AR



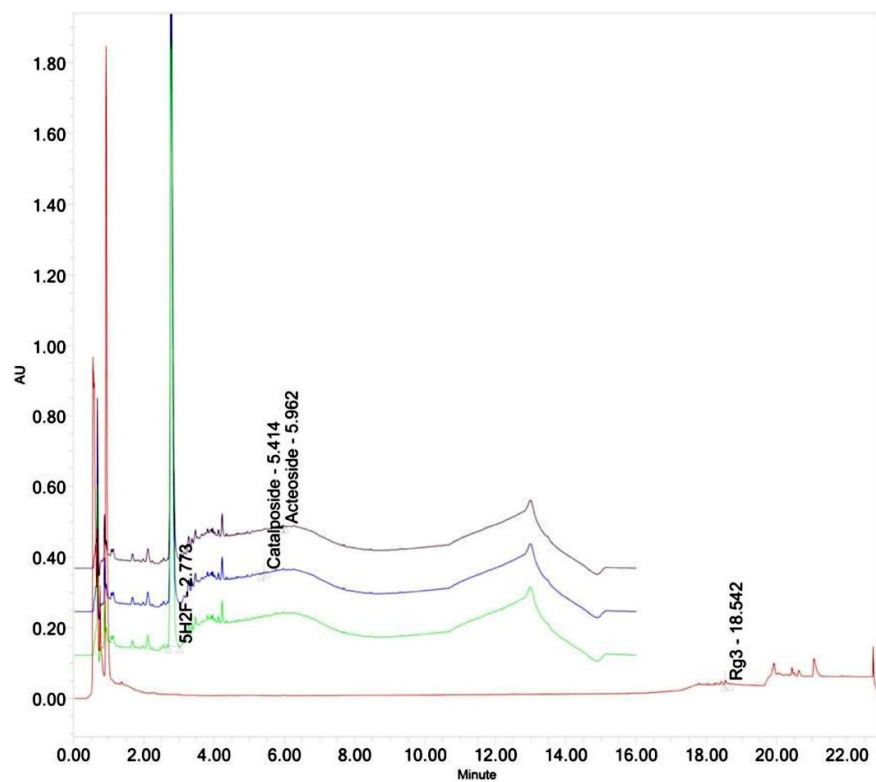
(B) Test AR



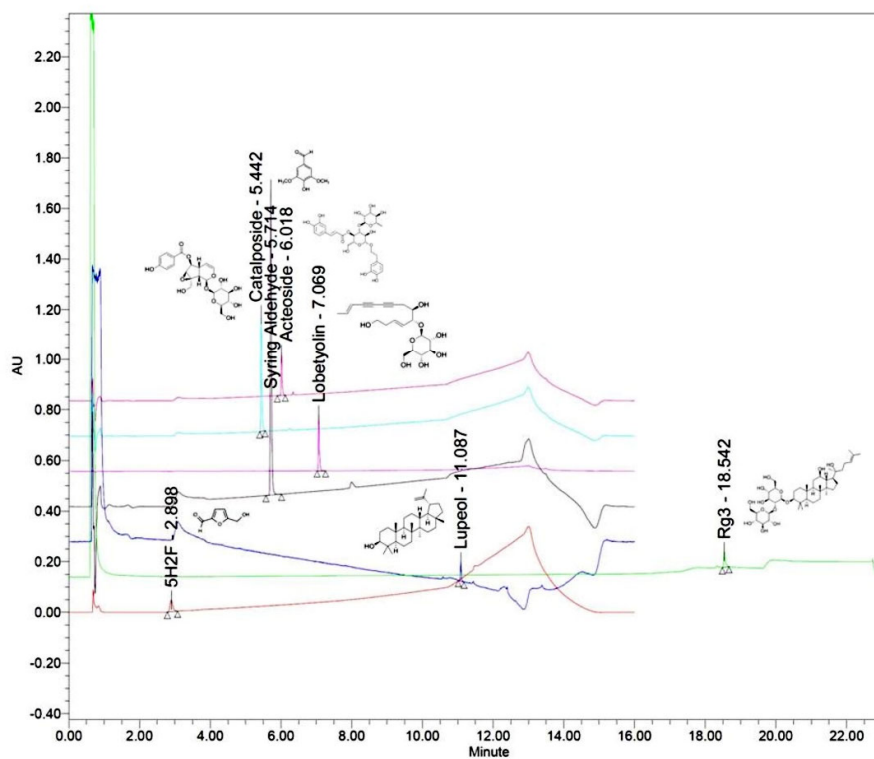
(C) Standard for KOG



(D) Test KOG



(E) Standard for SKOG



(F) Test SKOG

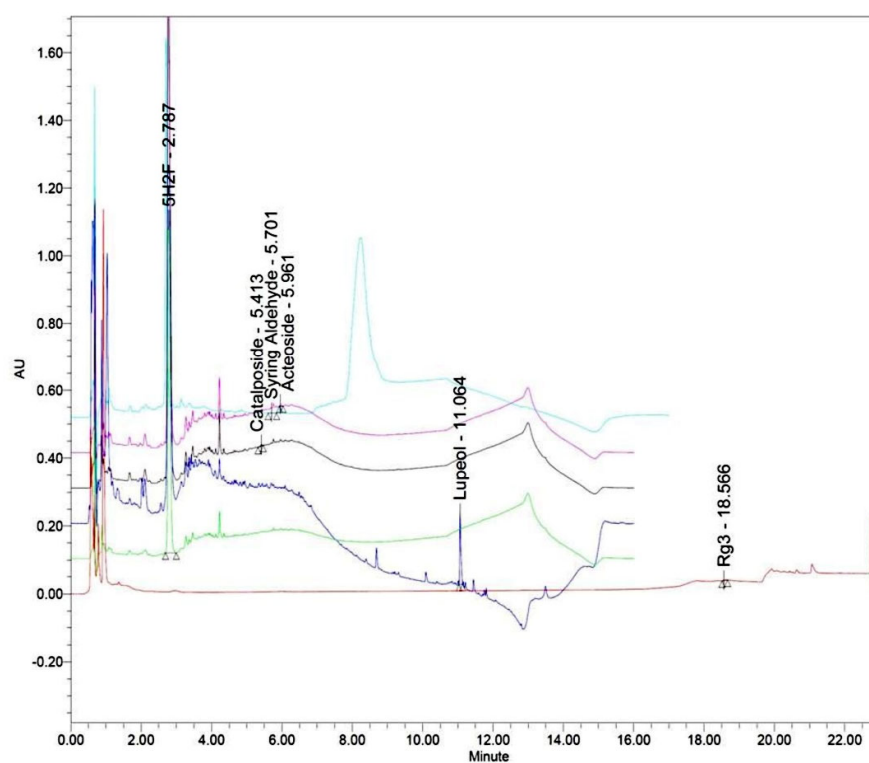


Figure S1. UPLC analysis of identification and quantification of lupeol, syringaldehyde, 5H2F, acteoside, catalposide, and Rg3 ingredients in SKOG, a mixture of AR and KOG. (A) standard for AR, (B) Test AR, (C) standard for KOG, (D) Test KOG, (E) standard for SKOG, and (F) Test SKOG.

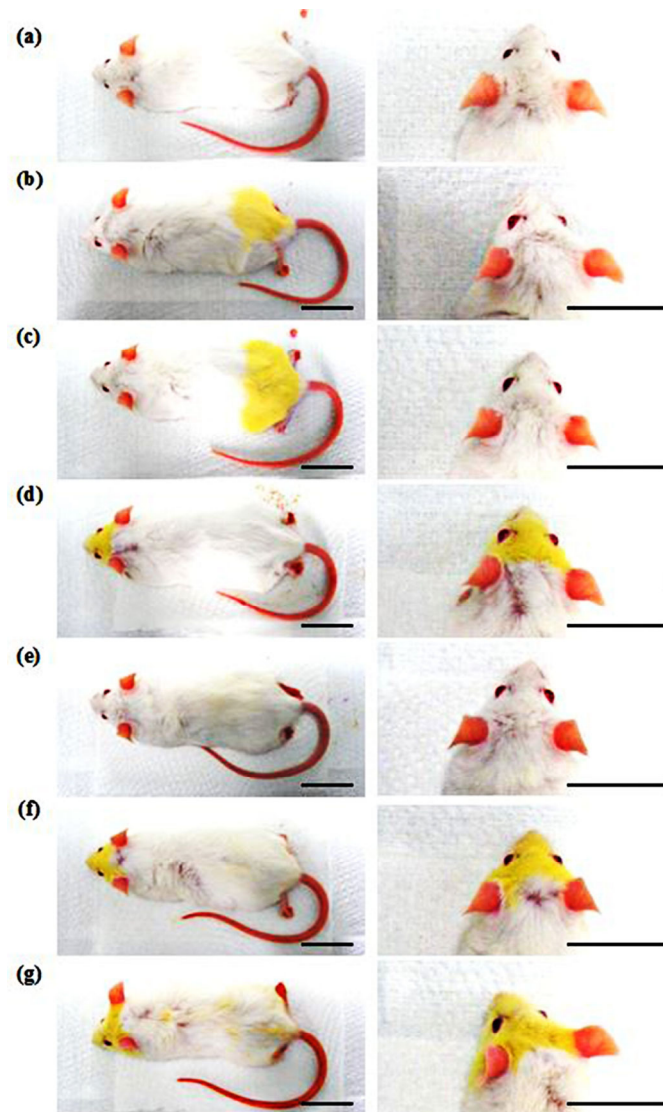


Figure S2. Representative gross findings of body surface in expectorant assay.

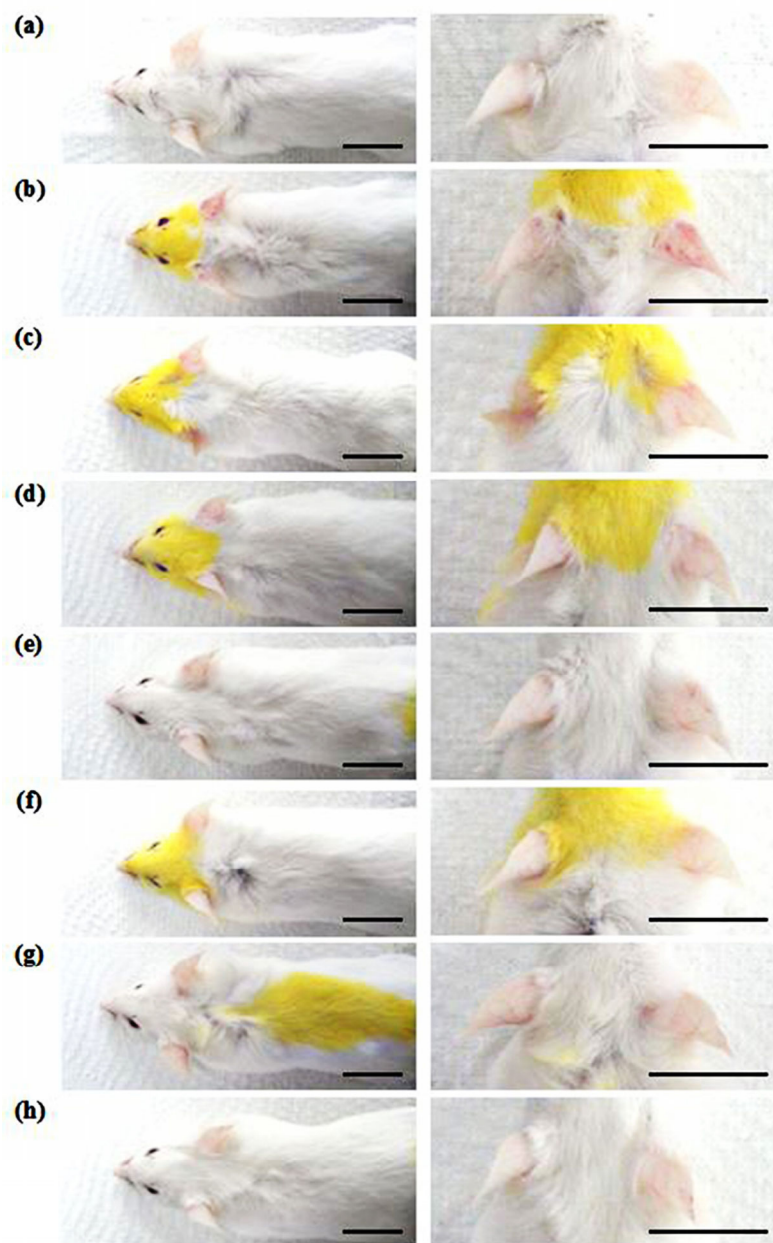


Figure S3. Representative gross findings of ear in anti-inflammatory assay.

Table S1: Composition of KOG and SKOG used in this study.

Herbs	Scientific Names	Production Distinct	Amounts (g)
Ginseng Radix Alba	<i>Panax ginseng</i> C. A. Meyer	Korea	4,500
Pulvis Hoelen	<i>Poria cocos</i> Wolf	China	9,000
Rehmanniae Radix Crudus	<i>Rehmannia glutinosa</i> (Gaertner) Liboschitz ex Steudel	Korea	47,000
Honey		Korea	39,000
Adenophorae Radix	<i>Adenophora triphylla</i> var. <i>japonica</i> Hara	Korea	4,500
Total	5 types		104,000

Individual herbs were prepared by Okchundang (Ulsan, Korea). AR = Adenophorae Radix (dried root parts of *Adenophora triphylla* var. *japonica* Hara) powders. KOG = *Kyeongok-go*, Traditional mixed herbal formulation, including Ginseng Radix Alba, Pulvis Hoelen, Rehmanniae Radix Crudus and honey. SKOG = *ShashamKyeongok-go*, KOG contains AR powders, test material

