Anti-inflammatory Effect of the Extract of *Gynostemma pentaphyllum* cell from Ullengdo Island as Korean Endemic Plant

Paek, Seung hye[1]; Seo, Hyo Hyun[1]; Mok, Bo-Ram[2]; Kim, Soo-Yun[1]; Jang; Young-su[2]; Shin, Jung U[2]; Moh, Sang Hyun[1*]

[1]Plant Cell Research Institute, BIO-FD&C Co., Ltd, Incheon 21990, S. Korea; [2]Department of Dermatology, Bundang CHA Medical Center, CHA University School of Medicine, South Korea

* Sang Hyun Moh, +82-10-8921-0435, biofdnc@gmail.com, shmoh@biofdnc.com

BIO-FD&C

GS_329

Introduction

The purpose of this study was to evaluate and verify the effectiveness of sustainable cosmetic raw materials developed from *Gynostemma pentaphyllum*(G.P), a plant native to Ulleungdo, in improving the skin barrier function and treating atopic dermatitis. Methods: Cells were derived from adult *Gynostemma pentaphyllum* plants, and suitable conditions for mass culture of the cells were established in a bioreactor. DNA components and amino acids extracted from this mass culture were identified from the HPLC fraction. In the in vitro efficacy evaluation results, changes in the expression levels of skin barrier-related proteins such as filaggrin (*FLG*) and Zonula occludens-1 (*Zo-1*) were insignificant. Results: DNA components such as Adenosine and Guanosine were detected in the HPLC analysis spectrum. On the other hand, amino acids such as benzene ring Phenylalanine and Tyrosine were also detected. Also, It was confirmed that the expression levels of the proteins thymic stromal lymphopoietin (*TSLP*) and interleukin-33 *(IL-33)* were significantly reduced. Discussion and Conclusion: These results lead to the conclusion that *Gynostemma pentaphyllum* cell extracts have significant anti-inflammatory effects and that these extracts can be widely used as sustainable, nature-friendly active material in cosmetics with anti-inflammatory effects and targeted at improving atopic dermatitis. They may find use in anti-aging cosmetic products as well.

Materials & Methods

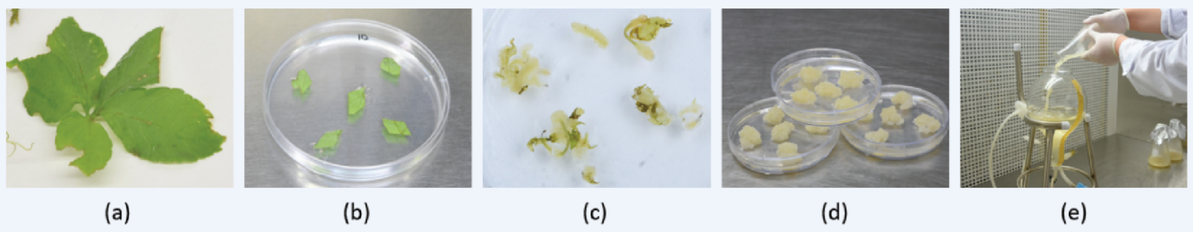
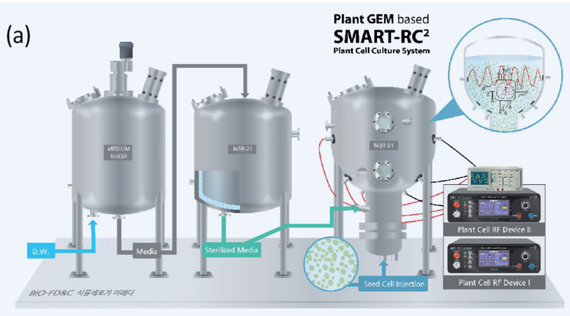


Fig. 1. Callus Induction of *Gynostemma pentaphyllum*
(a) Sterilized Leaf Blotting (b) Tissue Plating (c) Callus Induction (d) Callus Line Selection (e) Bioreactor Culture



Radio frequency Days	Name	Sample name	1st radio frequency treatment (20min)	rest period (2hrs) or Sampling	2nd radio frequency treatment (20min)	Sampling
3DAYs	Control	Con1-DAY3	-	Sampling		
	1DT1	1DT1-DAY3	O	Resting	O	Sampling

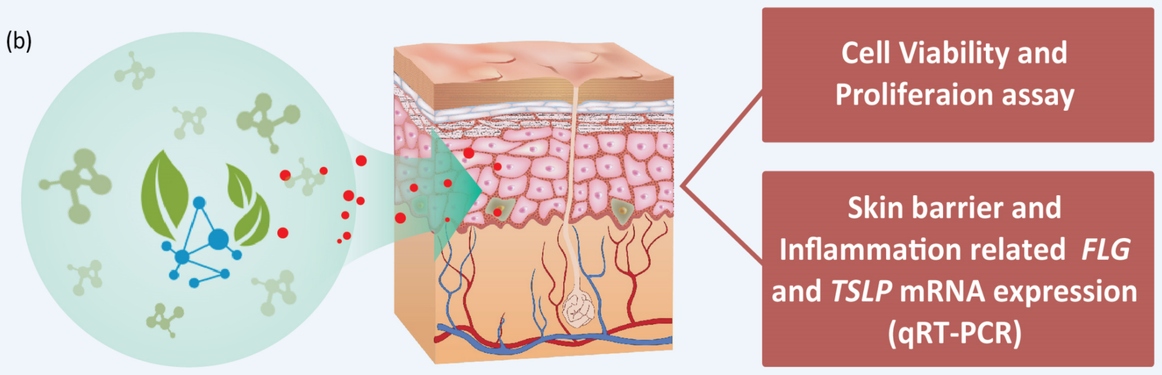


Fig. 2. Schematic diagram illustrating the current working experiment method.
(a)SMART-RC2 (Secondary Metabolite Accumulated Radiofrequency Technology Re-controlled Cell Culture) (b) multiple assays related to anti-inflammatory from in vitro.

Results & Discussion

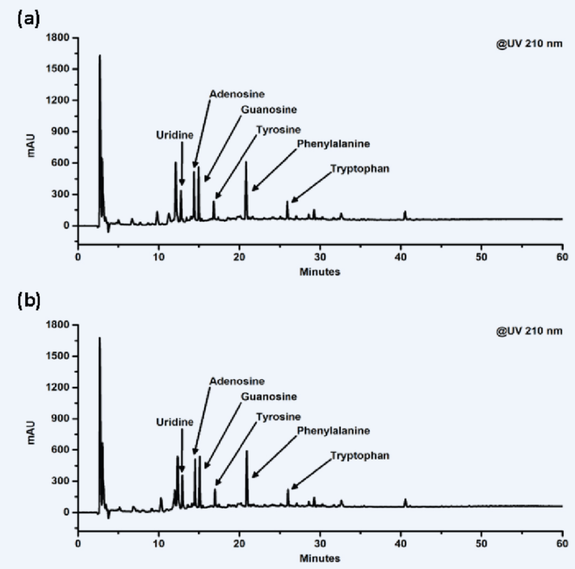


Fig.3. HPLC Chromatograms (detecting at UV 210 nm) of the Cell Extracts.
(a) The Cells in Culture without Radiofrequency-Process
(b) The Cells in Culture with Radiofrequency-Process

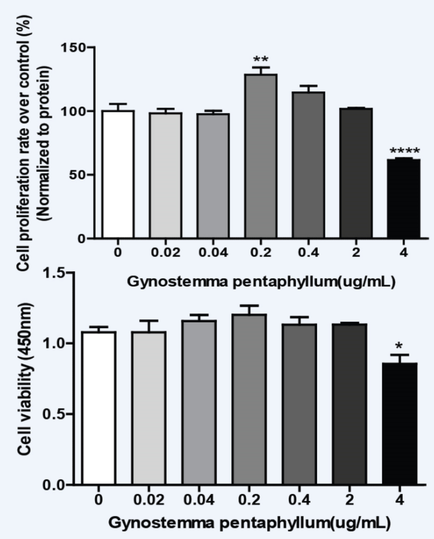


Fig.4. The effect of G.P on Cell Viability and Proliferation G.P was applied to culture medium for 24h.
(a) Variation of cell viability by concentration of G.P
(b) Variation of cell proliferation rate by concentration of G.P

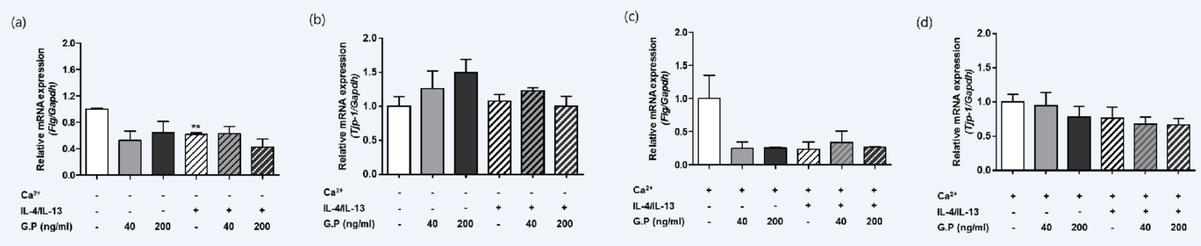


Fig.5. G.P doesn't improve skin barrier function in Th2 cytokine-mediated inflammation. Vehicle or G.P was applied to the culture medium for 5 days with or without IL-4/IL-13 in the absence (a-b) or presence (c-d) of 1.5mM Ca2+. (a-b) *FLG* and *ZO-1* mRNA expression in keratinocytes. (c-d) FLG and ZO-1 mRNA expression in Ca2+-differentiated keratinocytes. **P<0.01 vs non treated control

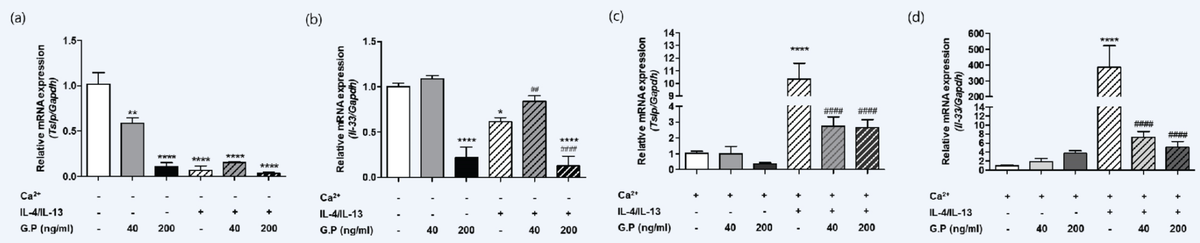


Fig.6. G.P reduces Th2 cytokine-mediated inflammation in Ca2+-differentiated keratinocytes. Vehicle or G.P was applied to the culture medium for 5 days with or without IL-4/IL-13 in the absence (a-b) or presence (c-d) of 1.5mM Ca2+. (a-b) *TSLP* and *IL-33* mRNA expression in keratinocytes. (c-d) *TSLP* and *IL-33* mRNA expression in Ca2+-differentiated keratinocytes. *P<0.05 vs G.P non-treated control; **P<0.01 vs non-treated control; ****P<0.001 vs non-treated control; ##P<0.01 vs IL-4/IL-13-treated control; ####P<0.001 vs IL-4/IL-13-treated control

Conclusions

Gynostemma Pentaphyllum cell extract derived from plants are expected to be used as a good material for various industries using native plants as well as the supply of anti-inflammatory products for the improvement of atopic dermatitis as a nature-friendly and eco-friendly material.

Aknowledgments

This research was supported by a grant from the Korea Health Technology R&D Project through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health & Welfare, Republic of Korea (grant number HP20C0029).

References

1. Renert-Yuval Y, Guttman-Yassky E (2019) What's New in Atopic Dermatitis. Dermatologic Clinics 37(2): 205-213.
2. Kim M, Kim J (2020) Phenotypes and endotypes of atopic dermatitis: Clinical implications. Allergy Asthma & Respiratory Disease 8(1): 9-14.
3. Kim MS, Kim KH, Yook HS (2012) Antioxidative Effects of Campanula takesimana Nakai Extract. Journal of the Korean Society of Food Science and Nutrition 41(10): 1331-37.
4. Choi EH, Man MQ, Xu P, Xin S, Liu Z, Crumrine DA, Jiang YJ, Fluhr JW, Feingold KR, Elias PM (2007) Stratum corneum acidification is impaired in moderately aged human and murine skin. Journal of Investigative Dermatology 127(12): 2847-56.