# Rice Vitamin (Inositol)

## B-complex vitamins from rice bran with moisturizing effect

Inositol is an isomer of glucose that occurs naturally. There are nine possible stereoisomers; the most important form is *myo*-inositol. *myo*-Inositol is initially considered a member of the vitamin B complex (B8) [1]. But since later it is found that human body has the capacity to synthesize inositol, it is no longer classified as a vitamin. Inositol is a carbohydrate, although not a classical sugar. It is almost tasteless, with a small amount of sweetness. The natural Inositol extracted from rice bran is used in cosmetic to continually provide moisture, to control sebum, and to supply aging restraint factor such as antioxidant.

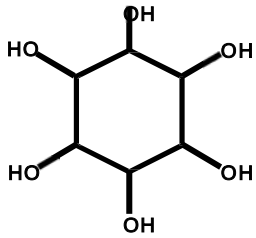


Figure 1: Structure of myo-inositol.

### 1. The effects of inositol on the skin moisturizing

The unique structure of the stratum corneum of the skin contributes to its function as a barrier to water loss and the external harsh environment. The injury to this barrier by the environment and common irritants with the resulting loss of water from the skin is the main reason for the development of dry skin or irritant dermatitis. Moisturizers can help to increase the hydration of the skin and possibly repair/restore the barrier through use of chemicals that are similar to the skin's natural moisturizing factors or occlusion of the skin to prevent water loss [2].

In order to study the effect of the continuation of usage of inositol in each amount of inositol in skin lotion on the moisture of skin, the skin lotion containing inositol of 0, 0.5, 1.0, 2.0, 3.0 wt% was applied evenly on the restricted area on both arms of the volunteers twice a day over the course of 6 weeks.

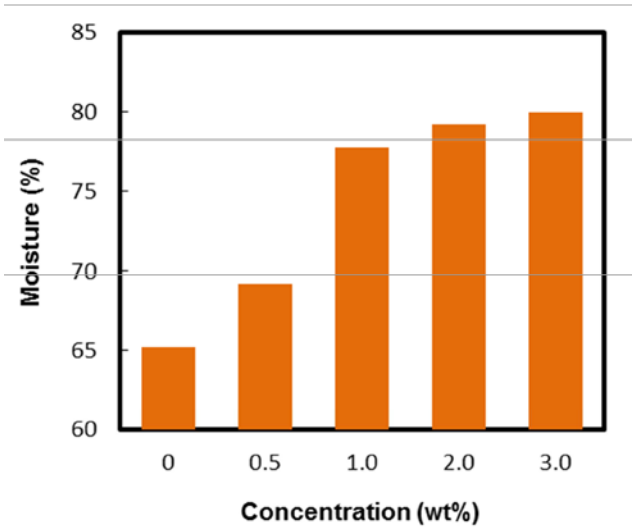


Figure 2: Effect of concentration of inositol in skin lotion on skin moisturizing. (Original data from [3])

Moisture of the skin was measured with aquameter (Corneometer®) at 21 C under the condition of moisture content of 65%.

Figure 2 shows the average amount of moisture of the skin at various concentration of inositol at 0, 0.5, 1.0, 2.0, 3.0 wt%. The moisture of the skin increased at the higher concentration of inositol from 0% (placebo) to 1.0 wt%. However, at the concentration of inositol over 1.0 wt%, the moisturizing result of the skin improved slightly compared to the amount of inositol increase. Therefore the skin lotion containing 1.0 wt% inositol was chosen and used in the subsequence experiment.

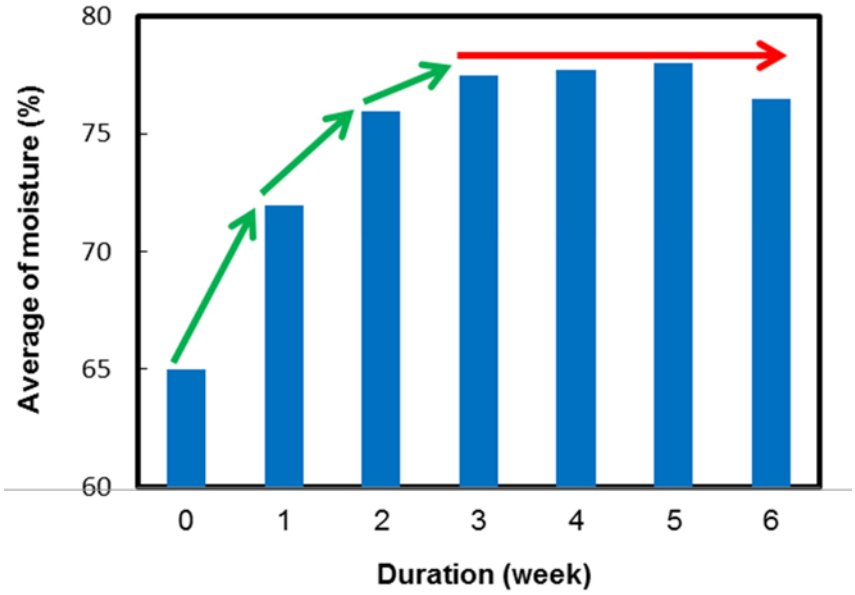


Figure 3: The usage of inositol skin lotion on the moisture of skin. (Original data from [3])

From the above result (Figure 2), the skin lotion containing 1.0 wt% inositol was chosen and applied to the healthy skin of inside of an arm once a day. Moisture of the skin was measured at 21 C under the condition of moisture content of 65% for 6 weeks at intervals of 1 week.

Figure 3 shows how long the inositol skin lotion has to be applied for the skin to show moisturizing results. After 1 week, the amount of moisture started to increase until the third week, compared the skin before the usage of the lotion. After 3 weeks, the result showed the stability of the amount of moisture. It was concluded that moisture increase was evident after one week application of moisture skin lotion with inositol, and the greatest improvement was sustained after about three weeks of application.

## 2. The effects of inositol on the amount of sebum in the skin

Sebum, which is secreted by the sebaceous glands together with other epidermal lipids, helps maintain hydration of the skin by providing a protective lipid layer on the skin surface that reduces fluid loss through the epidermis. Moreover, skin lipids and amino acids contribute to surface acidity, and a low pH protects the skin from pathogens [4].

To protect the skin from aging and bacterial penetration, an appropriate amount of sebum on the surface of the skin is required. It has been reported by dermatology that the optimum amount of sebum for the natural skin is 105-125 $\mu g/cm^2$.

The experiment was carried out by applying the skin lotion without and with 1.0 wt% inositol to the skin around face area of the volunteers for 5 weeks. The volunteers were divided into two groups; dry skin (low level of sebum) and oily skin (high level of sebum).

The result in Figure 4 shows that skin lotion with 1.0 wt% inositol compared with the placebo is able to control the amount of sebum and if used continuously for 5 weeks, dry and oily skin types can improve to be neutral skin types.

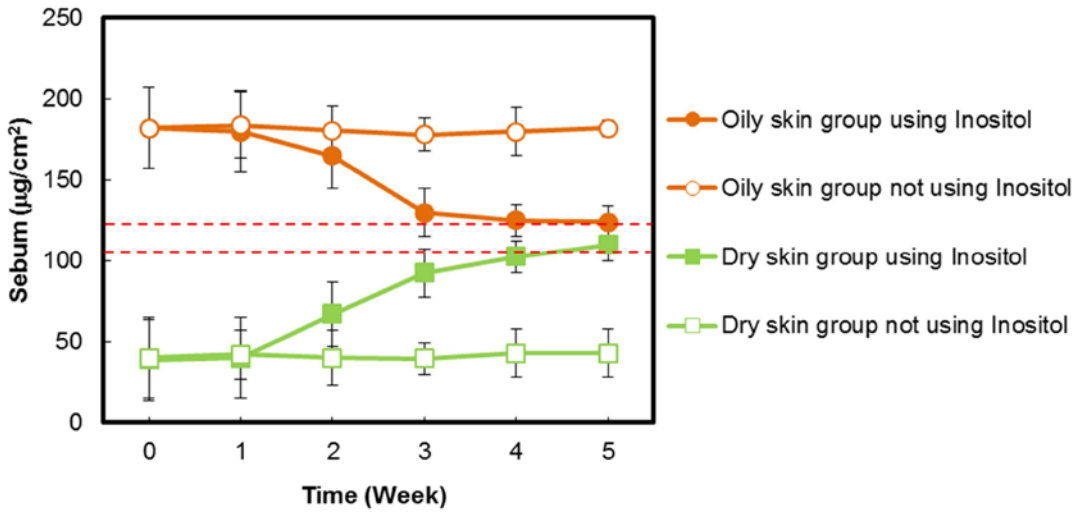


**Figure 4:** The amount of sebum as function of time after using 1.0 wt% inositol skin lotion for dry skin (green line) and oily skin (orange line). The area between red-dashed lines shows the optimum amount of sebum for the natural skin (105-125 $\mu g/cm^2$). (Original data from [3])

## 3. The effects of inositol on the elasticity of the skin

Skin consists mainly of two proteins—collagen and elastin. Collagen gives skin its structure, and elastin allows skin to stretch. Body produces less of these proteins with age, resulting in reduction in elasticity. Cosmetic products retards this aging process by preserving the level of elasticity of skin.

The skin lotion without (control) and with 1.0 wt% inositol was applied twice a day on the appointed area of face of volunteers. The elasticity of the skin was measured at intervals of 1 week for 6 weeks.

Figure 5A and 5B show the skin elasticity of people age between 20-30 years old (younger group) and 40-50 years old (older group) after the usage of skin lotion with 0, 1.0 wt% of inositol on the face. In Figure 5A, the elasticity of older group after the usage of 1.0 wt% inositol skin lotion for 5 weeks was getting close to the elasticity of younger group before the usage of inositol skin lotion.

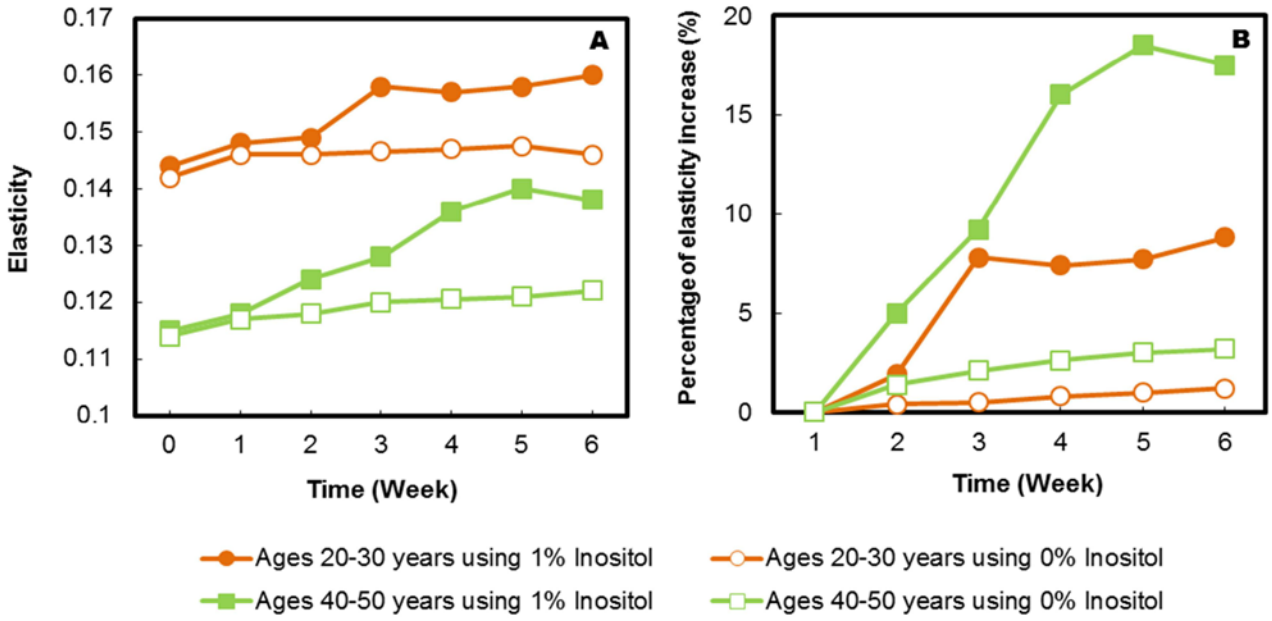


**Figure 5:** Elasticity variation (A) and percentage of elasticity increase (B) as function of time after using 0%, 1.0% inositol skin lotion from each age. (Original data from [3])

The percentage of elasticity increase is shown in Figure 5B. After one week of using 1.0 wt% inositol skin lotion, the elasticity of older group increased drastically until 17% after continuation of usage for 5 weeks. Compare to the placebo (skin lotion without inositol), the improvement degree was better when 1.0 wt% inositol skin lotion was used, regardless of age. The improvement was noticable for the 40-50 years old group.

From this study, the 1.0-2.0 wt% inositol appeared to be the optimal amount in order to achieve maximum elasticity effects. It is believed that inositol increases the activity of the face tissue's age cells, increases hydration and softens a part of the accumulated adipose tissue which is accumulated by hardness of aging into a gel like condition, to increase the skin's elasticity [5]. Moreover, inositol increases the flow of the capillary vessel to easily deliver the nutrients to the cells and reproduces the reticular layer cells to improve the skin's elasticity.

## Properties

| | | |
|---|---|---|
| **INCI name** | : | INOSITOL |
| **Appearance** | : | White, odorless, crystalline powder |
| **Solubility** | : | Freely soluble in water, slightly soluble in ethanol |
| **Stability** | : | Very stable at 30 C up to 60 months and at 50 C for at least 6 months |

## References

[1] Parthasarathy, R., and Eisenberg, F.Jr. (1986). The inositol phospholipids: a stereochemical view of biological activity. *Biochem. J.,* **235**, 313-322.

[2] Marino, C. MD. Skin Physiology, Irritants, Dry Skin and Moisturizers. *MPH Report Number 56-2-2001a August 2001* (Revised June 2006).

[3] Zhoh, C.K., Song, H., Han, C.G., and Tsuno, T. (2001). The effects of inositol extracted from rice on the skin. *Daikankeshouhingakkai (Korean cosmetic conference) on 6-8 March, 2001*.

[4] Boelsma, E., Lucy P.L. van de Vijver, Goldbohm, R.A., Klöpping-Ketelaars, I. A.A., Hendriks, H. F.J., and Roza, L. (2003). Human skin condition and its associations with nutrient concentrations in serum and diet. Am. J. Clin. Nutr., 77(2), 348-355.

[5] Kotaki, A., Sakurai, T., Kobayashi, M., and Yagi, K. (1968). Studies on myo-inositol: IV. Effect of myo-inositol on the cholesterol metabolism of rats suffering from experimental fatty liver. J. Vitaminol., 14, 87-94.