

Bathing in ultra-pure soft water improves skin barrier functions both in patients with atopic dermatitis and in atopic NC/Nga mice

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【The purpose of the study】 Skin barrier function plays important roles to protect our skins from drying and irritant penetration. On the other hand, dysfunction of the barrier function causes dryness and irritation to owners of sensitive skin. Impaired barrier function may facilitate antigen penetration resulting in onset and/or exacerbation of allergic skin disorders. Therefore, appropriate skin care that improves skin conditions is necessary to support successful treatment in allergic dermatitis. Although soap is a good cleansing agent to keep our skins clean, its effectiveness is reduced when used in hard water with high levels of minerals. Hardness in water is caused by the presence of mineral salts, mostly those of calcium (Ca^{++}) and magnesium (Mg^{++}). The mineral salts react with soap to form an insoluble precipitate known as soap scum. Since soap scum remains tightly on skins and does not rinse away easily, it may become one of causes that exacerbate dermatitis as an irritant. In this study, we used cation-exchange resin to prepare ultra-pure soft water (UPSW) replacing both Ca^{++} and Mg^{++} with sodium ions, and investigated effect of UPSW rinsing on dry skins in subjects with atopic dermatitis (AD). Furthermore, we investigated effect of UPSW on AD in detail by using atopic NC/Nga mice.

【Methods】 After 4 weeks of bathing in UPSW, the water content of the stratum corneum and transepidermal water loss (TEWL) of volunteers with mild atopic dermatitis were measured. By using NC/Nga mice, we attempted to confirm data obtained from atopic volunteers.

【Results】 In skins of atopic volunteers who used UPSW for bathing, the water content in stratum corneum was increased and TEWL was decreased. Most volunteers stated that dryness and itch of skins were weakened. After washed with soap and rinsed in UPSW for 3 weeks, severe dermatitis of NC/Nga mice were slightly reduced as well as TEWL. On the other hand, dermatitis in NC/Nga mice rinsed in city water became worse. When compared with distilled water, UPSW was more effective in improvement of skin conditions in NC/Nga mice.

【Conclusion】Dryness and itch in skins of atopic volunteers were weakened, when they used UPSW for bathing. UPSW was more effective for improvement of clinical skin conditions and TEWL in NC/Nga mice when compared with the use of distilled water, indicating that bathing with UPSW may be safe and beneficial skin care for patients with atopic dermatitis.