WOUND HEALING

EFFECT OF HIMALAYAN GLACIAL MELTWATER ON NORMAL HUMAN SKIN CELLS AND 3D SKIN EQUIVALENT HEALING MODEL

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Background: The healing effect of mineral water has been mentioned since the Ancient Roman Empire period. With the increasing focus on skin health and wellness, hydrotherapy keeps getting more popular for years. Aside from the rising thermal spring water treatment, the application potential of cold mineral spring water in skin care still remained unclear. Himalayan Glacial Meltwater (GMW), originating from Qinghai-Tibet Plateau, is natural low-deuterium cold mineral water with a stable physicochemical composition. It is characterized by the presence of calcium, magnesium, bicarbonate and significant amounts of metasilicic acid.

Objective: This study aims to evaluate the effect of GMW on human skin cells in monolayer cultures. We also evaluated its efficacy on cell proliferation, differentiation and the extracellular matrix synthesis in 3D full-thickness skin equivalent (SE) healing models.

Materials and Methods: For in vitro monolayer cultures, normal human dermal fibroblasts, keratinocytes and dermal microvascular endothelial cells were cultivated with growth medium supplemented with GMW for 48h. For 3D SE reconstructed with fibroblasts and keratinocytes, GMW was supplemented daily at a concentration of 2% starting from the first medium removal after cell seeding until the end of the culture.

Results: GMW treatment significantly increased the viability of all types of skin cells in monolayer cultures. For 3D SE healing model, the immunohistology analysis showed GMW application promoted the expression of Ki-67 and filaggrin in epidermis, laminin 332 and collagen VII at dermal-epidermal junction zone. GMW also increased the expression of dermal components controlling the structure, elasticity and stability such as elastin and collagen III.

Conclusions: GMW has beneficial effects on the viability of various types of skin cells, and meanwhile could accelerate the skin remodelling on 3D equivalents. These data indicated the potential of this GMW as an adjuvant active or “cosmeceutical” ingredient in formulas to improve the skin healing process.