

CHAPTER I

INTRODUCTION

1.1. Background

The stratum corneum (SC) is the outermost layer of skin epidermis. It is composed of corneocytes and the intercellular lipid matrix. The corneocyte plays a role in skin moisturizing by attracting and retaining the water. Inside the corneocytes, there are hygroscopic components called natural moisturizing factor (NMF) that work as a humectant for the skin. The NMF, primarily composed of free amino acids, are the end-products of the degradation of one of the proteins in corneocytes, filaggrin protein (Rawlings & Harding, 2004). The protein is regulated by the FLG gene, which belongs to the 'fused' gene family that expresses epidermal differentiation proteins (Sandilands et al., 2009). In addition to NMF production, the filaggrin protein has its function as a skin barrier along with other proteins, such as keratin. If it is not being degraded, the amount of NMF greatly affects skin conditions, where a low number of NMFs produces dry skin, compared to moisturized skin (Harding & Rawlings, 2006).

The main goal of skin moisturizing is to maintain the structure of the epidermal layer, known as the brick-and-mortar concept, comprised of corneocytes and intercellular lipid matrix. It protects the skin from dehydrating and blocking harmful substances from entering the skin. Dry, rough, and flaky skin are examples of impaired brick because it has been damaged (Lees, 2012). The impaired skin condition can be achieved from gene mutation of the FLG gene (Hoppe, 2013), but external factors such as aging, bathing, and UV radiation are predominantly causing dry skin by decreasing the NMF production (Rawlings & Harding, 2004).

Moisturizer application is necessary to repair the brick wall structure of the skin. It comes with different formulations with the same role, to rehydrate and smoothen the skin. The moisturizer works instantly due to the humectant component that attracts water. In addition, previous studies stated there was an altered expression of genes involved in keratinocyte differentiation. However, the moisturizer effects on skin moisturizing are still not well understood (Hoppe, 2013). The alteration of

gene expression could be beneficial for long-term period usage of moisturizers, as it could determine whether the product is only temporarily relieving the dry skin condition or not through molecular testing.

Among various methods to study gene expression on skin samples such as northern blot, serial analysis of gene expression (SAGE), and microarrays, the quantitative-reverse transcription polymerase chain reaction (RT-qPCR) method is simple, inexpensive, yet sensitive to detecting the expression of small target genes (Mo, Wan & Zhang, 2012). The previous study showed that there are impacts of moisturizer application in the gene expression for skin moisturizing using RT-qPCR, but researchers did not measure the end-product from gene expression in skin moisturizing, which is the NMF (Buraczewska et al., 2008; Hoppe, 2013). Studies by Dapic et al. (2013) and Kezic et al. (2009) were done to measure NMF content as the biomarker of FLG expression using a non-invasive sample collection technique. Both studies used high-performance liquid chromatography (HPLC) as the method to determine the NMF component. Despite being flexible and having high sensitivity, HPLC requires a certain skill to operate and troubleshoot the machine (Wong, 2013). Colorimetric could be the alternative of choice as it is easy to operate and interpret.

1.2. Objective

- a. To evaluate the effect of moisturizer application towards NMF production.