Relationship between water-sebum ratio and skin barrier function

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Introduction:

People often use the term “oil and moisture balance” to describe their skin condition subjectively. However, there is no existing research on what the appropriate water-sebum ratio is, and there is not enough explanation for their effects on skin characteristics. In this study, we studied the relationship between water-sebum ratio and skin barrier function.

Materials & Methods:

Total 438 Korean subjects including 217 females and 221 males were enrolled in this study. Skin water content, sebum, and TEWL were measured. In addition, since TEWL can be affected by sex, season, and measurement sites, the data were assorted considering those factors. Then, the subjects’ TEWL data were divided into three groups to categorize healthy (top 20%) and poor (bottom 20%) barrier function groups, and the relationship between TEWL and water-sebum ratio were assessed. The groups were categorized as high (top 20%) and low (bottom 20%) water-sebum ratio, and the effects of water-sebum ratio on skin barrier function were reassessed.

Results & Discussion:

Several factors affecting skin barrier function
In this study, we identified that those factors affect the skin barrier function (Fig. 1A, 1B, 1C), and therefore the measurement site in this study was confined to cheek, and the season for the measurements were spring.

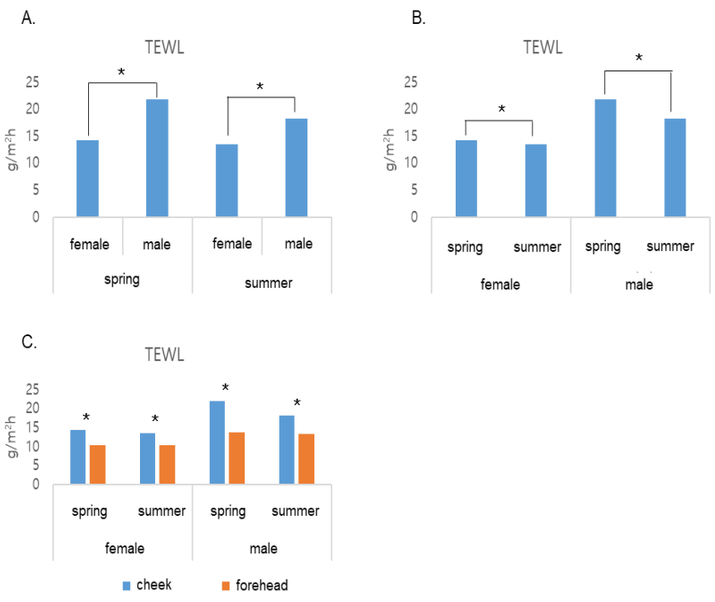

Fig. 1. Factors affecting skin barrier function measurement. A. Effects of sex on skin barrier function, B. Effects of season on skin barrier function, C. Effects of measurement sites on skin barrier function. Data were analyzed by either Repeated measures ANOVA Contrast test. *p<0.05

Effects of skin barrier function on water-sebum ratio
The groups with healthier skin barrier function showed significantly lower water-sebum ratio (water-sebum ratio = sebum / water) compared to the group with low skin barrier function (Fig. 2A-2D).

In addition, there was a negative correlation between skin barrier function and water-sebum ratio (Table 1). These findings were observed in both male and female groups.

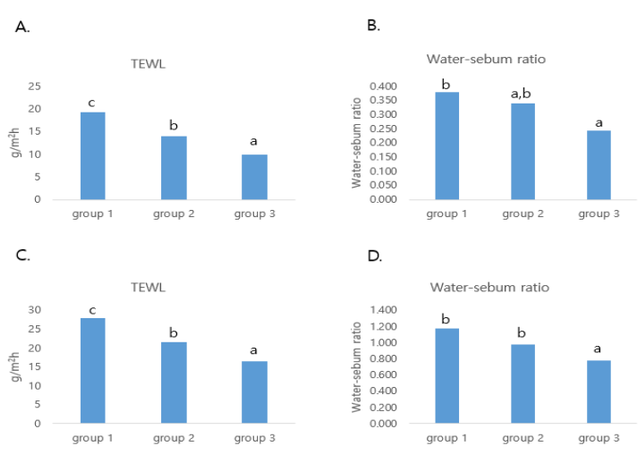

Fig. 2. Effects of skin barrier function on water-sebum ratio. A. Female categorization based on skin barrier function. B. Water-sebum ratio of female groups. C. Male categorization based on skin barrier function. D. Water-sebum ratio of male groups. (Group 1: TEWL top 20%, Group 2: TEWL middle 60%, Group 3: TEWL bottom 20%). Different lowercase letters indicate significant differences among groups.

TEWL – water-sebum ratio	Female	Male
Pearson's r	-.252**	-.174**
significance (p)	0.000	0.000

Table 1. Correlation between skin barrier function and water-sebum ratio.

Effects of water-sebum ratio on skin barrier function
The groups were re-categorized based on their water-sebum ratio to find out the effects of water-sebum ratio on skin barrier function. Subjects with higher water-sebum ratio group showed significantly lower skin barrier function compared to the groups with low water-sebum ratio (Fig 3A-3D).

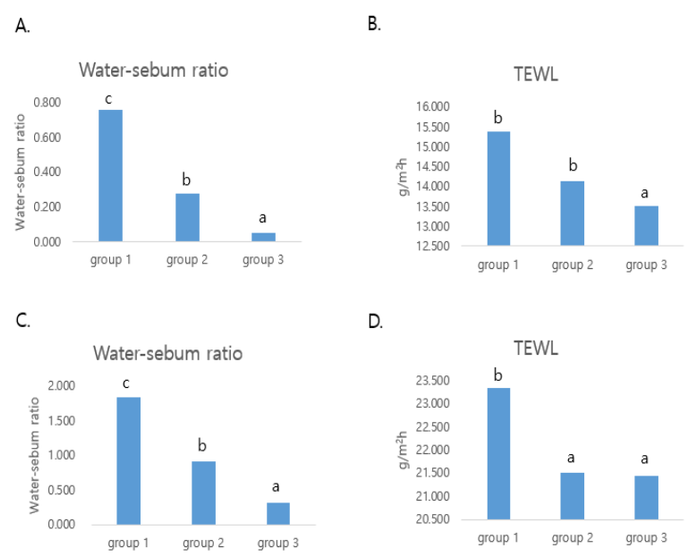

Fig. 3. Effects of water-sebum ratio on skin barrier function. A. Female categorization based on water-sebum ratio. B. TEWL of female water-sebum groups. C. Male categorization based on water-sebum ratio. D. TEWL of male water-sebum groups. (Group 1: water-sebum ratio top 20%, Group 2: water-sebum ratio middle 60%, Group 3: water-sebum ratio bottom 20%). Different lowercase letters indicate significant differences among groups.

Conclusions:

Skin water-sebum ratio is frequently used to describe the subjective feelings of skin condition. Higher skin water-sebum ratio is negatively correlated with skin barrier function, which may affect other skin characteristics. Further research is required to study the effects of water-sebum ratio on skin characteristics.

References:

1. Park, KC et al. (2002). Evaluation of facial skin type by sebum secretion: discrepancies between subjective descriptions and sebum secretion. *Skin Res Technol*, 8(3),168-72.