



# Effect of face mask on skin changes over 9 months during the COVID-19 pandemic

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## Introduction:

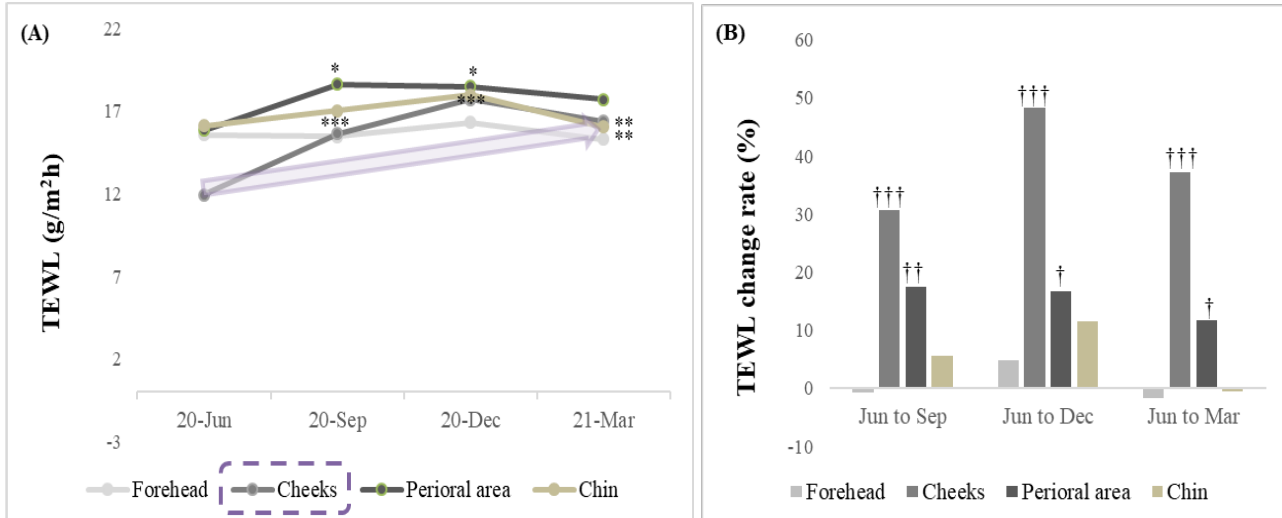
Coronavirus disease 2019 (COVID-19) was observed since December 2019 that has spread worldwide and continued to today. As COVID-19 has been prolonged, wearing a mask has also become daily routine. There have been skin side effect caused by masks [1,2], but few have studied how skin characteristics change over time by wearing a mask [3]. Therefore, in this study, we found out the skin characteristics and change caused by the new situation of wearing a mask for a long time.

## Materials & Methods:

- Participants: Nineteen healthy men and women.
- Measurement periods: June, September, December 2020 and March 2021.
- Skin temperature, skin redness, trans-epidermal water loss (TEWL), skin hydration, skin keratin amount, skin elasticity, skin color (L, a, b value) and skin pore area were measured.
- Measuring area: mask-wearing area (cheek, mouth and chin) and non-mask-wearing area (forehead).

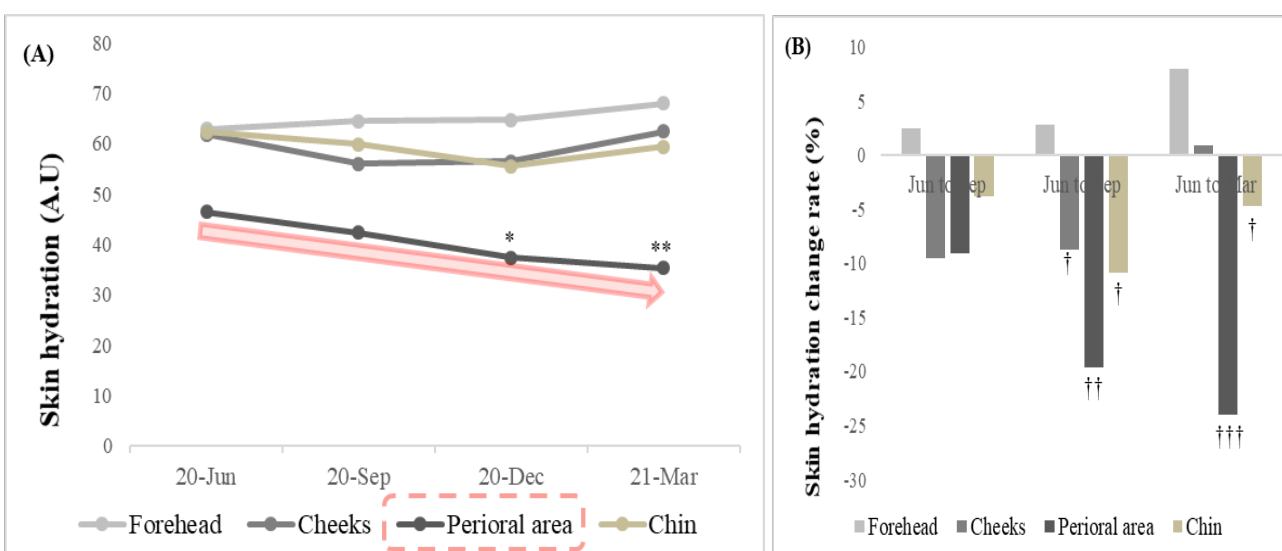
## Results & Discussion:

In March 2021 compared to June 2020, **TEWL of cheek significantly increased and TEWL of perioral area increased**. Mask-wearing areas showed significant difference compared to forehead which was non-mask-wearing area (Figure 1).

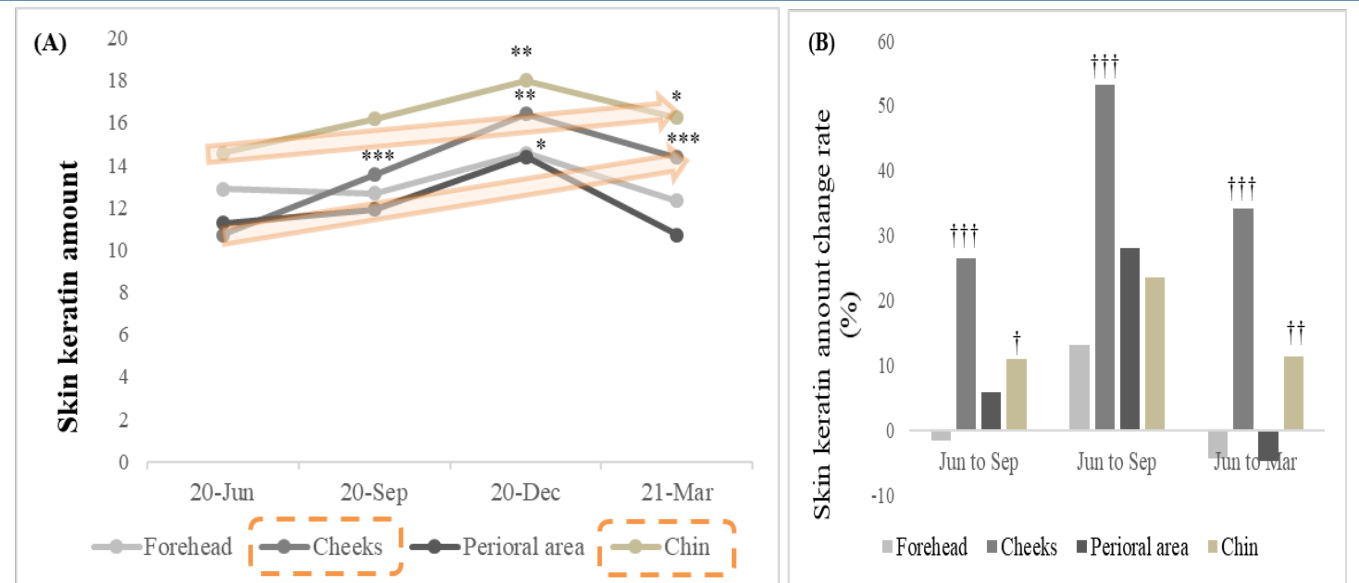


**Figure 1.** (A) TEWL result of each measurement area. (B) TEWL change rate of each measurement area from June to September, December and March.

**Skin hydration of perioral area and chin significantly decreased respectively** (Figure 2). **Skin keratin amount of cheek and chin significantly increased respectively** (Figure 3) They showed significant difference compared to forehead.

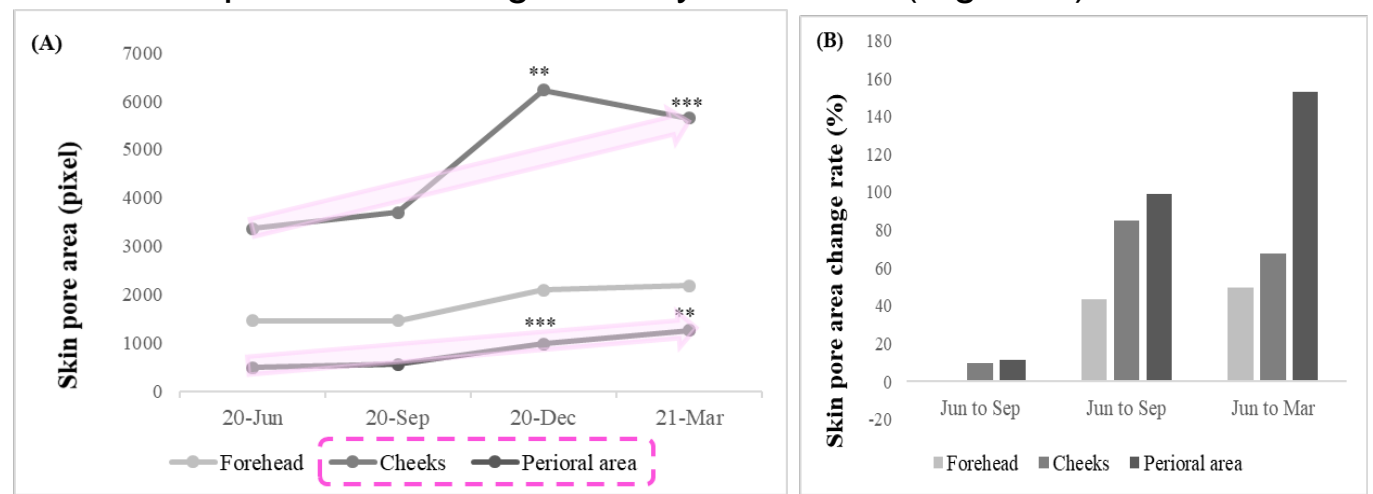


**Figure 2.** (A) Skin hydration result of each measurement area. (B) Skin hydration change rate of each measurement area.



**Figure 3.** (A) Skin keratin amount result of each measurement area. (B) Skin keratin amount change rate of each measurement area.

**Skin lightness (L\*) of cheek significantly decreased and skin redness (a\*) of cheek significantly increased**. These values showed significant difference compared to forehead. Skin yellowness (b\*) of cheek significantly decreased. **Skin pore area of cheek significantly increased** and showed significant difference compared to forehead. Skin pore area of perioral area significantly increased (Figure 4).



**Figure 4.** (A) Skin pore area result of each measurement area. (B) Skin pore area change rate of each measurement area.

Skin elasticity significantly decreased in all area and skin temperature significantly increased in all area. Skin redness of cheek increased.

► **Skin changes in mask-wearing area were different from non-mask-wearing area**. TEWL, skin keratin amount and skin pore area increased in mask-wearing area while skin hydration and skin elasticity decreased. Skin color also changed, redness of skin increased. On the other hand, lightness and yellowness of skin decreased.

## Conclusions:

**Wearing a mask for a long time affected TEWL, skin hydration, keratin amount, color, and pore area of mask-wearing area**. Our result is meaningful in that the effect of face mask on skin characteristics was studied when ordinary people wear a mask for a long time in their daily life.

## References:

1. Kaihui Hu, Jing Fan, Xueqin Li, et al. (2020). The adverse skin reactions of health care workers using personal protective equipment for COVID-19. *Medicine*, 99:24.
2. Scarano A, Inchingolo F, Lorusso F. (2020). Facial skin Temperature and discomfort when wearing protective face masks: Thermal infrared imaging evaluation and hands moving the mask. *Int J Environ Res Public Health*, 17, 4624.
3. Hye Sung Han, Sun Hye Shin, Jae Wan Park, et al. (2021). Changes in skin characteristics after using respiratory protective equipment (medical masks and respirators) in the COVID-19 pandemic among health care workers. *Contact Dermatitis*, 1-8.