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# The Association between Skin Type and Skin Care Behavior and Stress Perception during COVID-19 Pandemic

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## Abstract

**Purpose:** During the coronavirus disease-19 (COVID-19) outbreak, mask-wearing is required to protect against and limit the spread of infection, but it can directly affect skin problems. Change in skin condition might be related to mental health. This study explored the association between skin conditions and behavior of skin cares and stress levels during the Covid-19pandemics. **Research design, data and methodology:** A survey was conducted on 516 adults who were aware of damaged skin due to continuous wearing of masks for a long time during the COVID-19 Pandemic. The study included 164 men and 352 women in the Republic of Korea. **Results:** Skin conditions and behavior of skin cares associated with stress perceptions. A multiple linear regression model was used adjusting for potential confounder. **Conclusion:** Since management so far in the COVID-19 Pandemic can cause skin concerns and change the original skin type, it is necessary to redefine and improve the use of skin care, face-washing methods, and functional cosmetics. People with high and low interest in skin type recognition and management were evenly identified, and it was confirmed that stress awareness decreases as awareness of skin care attitude increases.

**Keywords :** COVID-19, Skin type, Skin care attitude, Skin concerns

**JEL Classification Code:** I12, L80, Y40

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## 1. Introduction

The Director-General of the World Health Organization (WHO) declared the novel coronavirus disease (COVID-19) a global pandemic in an all-out remark at a press briefing on March 11, 2020. In Korea, social distancing, mask wearing, travel restrictions, telecommuting of companies and institutions, schools are converted to non-face-to-face classes, and face-to-face meetings and various gatherings

are reduced or The threat to physical and mental health is amplified due to depression and anxiety caused by cancellation. It is said that the form of life changes and daily life shrinks due to a sense of uncertainty about infection, and in a study on stress and quality of life caused by COVID-19, the quality of life seems to be significantly lowered (Kim & Cho, 2020). In this situation, research and countermeasures for stress on skin types are needed, and we wanted to study the changed skin sensitivity and skin care attitude of current

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consumers. In order to limit the spread of infection prevention during the outbreak of COVID-19, wearing a mask for a long time directly affects the condition of the skin, and with the recognition that using products suitable for one's skin type can lead to healthy skin, personalized customization The need for care is increasing. In addition, sebum secretion that can cause problematic skin can change according to various environments, situations, and management methods. In general, since skin types are classified into oily, neutral, dry, and combination (Youn, 2005), it is announced that choosing skin care suitable for one's skin type can be helpful for skin health. Wearing a mask is essential in the COVID-19 pandemic situation, and changes in skin condition due to direct contact between the mask and the skin and long-term wearing have become unavoidable phenomena. As wearing masks has become commonplace, skin trouble and contact dermatitis have emerged as the most common skin diseases.

This phenomenon can cause skin temperature to rise, pores expand, and problematic skin such as acne and skin trouble due to long-term wearing of masks, creating an environment in which contact dermatitis can occur (Kim & Yoo, 2020). As a result, skin troubles and contact dermatitis have emerged as the most common skin problems. Since these skin conditions continuously occur, it is assumed that each individual's skin care behavior should be different, and that the degree of stress will vary according to the phenomena that can occur by skin type. In other words, it was confirmed that there was a significant difference in the degree of stress awareness when combination skin, oily skin, skin with tightness depending on the moisture state, also a lot of dead skin cells, frequent troubles, or acne. Therefore, it is presumed that people with a low awareness of stress are people who take good care of their skin with interest and maintain a healthy skin condition, and this part is judged to have an effect on their perception of stress. With the mandatory wearing of masks as a preventive strategy to combat the COVID-19 pandemic (Kim, 2020), it has been reported that individuals' skincare behaviors and skin types may change (Kim & Yoo, 2020), but no studies have examined the effects of skincare behaviors and skin types on stress during the COVID-19 pandemic. Therefore, this study is to investigate the relationship between Skin Type and Skin Care Behavior and Stress perception during COVID-19 Pandemic.

## 2. Theoretical Background

### 2.1. Skin type and Skin Care Behavior

Looking at the description of skin type, an overview of skin type and determinants of skin type are described in

detail in a study on the relationship between cleansing product use and skin care and skin type (Shin, 2017), and this study referred to the definition of skin type. Neutral skin refers to skin with normal skin tissue condition and skin physiological function. Skin with low sebum secretion, dry skin, which is prone to skin irritation due to dead skin cells on the surface of the skin, and oily skin is prone to trouble by blocking pores called sweat glands due to excessive sebum secretion. Skin that shows a combination of two or more skin is called complex skin, and sensitive skin is skin caused by congenital factors, which does not affect other factors and responds to sensitive skin. Lastly, acne skin is an area with a high amount of sebum secretion, and it usually occurs on the face, neck, and chest, and acne skin is classified as inflammatory or non-inflammatory skin, which is classified as a disease. In addition, skin care refers to identifying one's skin type, selecting cosmetics suitable for one's skin, and properly managing them. In this paper, we used skin type recognition, skin oil condition, skin moisture condition, skin trouble condition, acne condition, skin concern, face wash (on a daily basis), skin care room usage, and skin care room reason according to skin conditions. Taking good care of your skin is a way to make and maintain healthy skin as well as to pursue beautiful skin. Therefore, we will study the effect of skin type and skin care behavior on stress awareness after COVID-19.

#### 2.1.1. Characteristics of Targets to Survey

During COVID-19, there will be significant differences in skin type and skin care behavior according to the general characteristics of the survey subjects, and socio-demographic factors, socio-economic factors, residential areas, and skin care behavior will change. It can be seen that factors related to anxiety and stress caused by COVID-19 were conducted for the purpose of studying related factors, focusing on socio-demographic characteristics and satisfaction according to residential area (Lee, 2021).

#### 2.1.2. Changes in Skin Condition Due to Wearing a Mask

There will be a significant difference in stress perception depending on skin type and skin care behavior, and it will also affect stress perception. The results of examining the difference in skin types before and after COVID-19 in the effect of wearing a mask on skin types and skin care behavior of adults (Bae, 2021) are as follows. Oil, dead skin cells, acne, and acne were found to have increased after COVID-19, and moisture decreased after COVID-19 before, resulting in statistically significant differences. Therefore, those surveyed by skin type who recognized the change in skin condition due to wearing a mask for a long time expected that the change in skin care behavior would have a significant effect on stress awareness, and skin types include neutral, dry, complexity, and sensitivity. Professor Lee Soo-

ji (Kyunghee Korean Oriental Medicine Hospital bedding clinic) also concluded that when body temperature rises by 1°C, sebum secretion increases by 10%, and sebum secretion naturally increases in hot summer (Son, 2020). In general, sebum secretion rises in summer compared to other seasons, and it is known that the wearing of masks causes excessive sebum secretion as the temperature of the face increases rapidly. For these reasons, the reality is that many office workers feel uncomfortable wearing masks. Entering the summer, the environment of the workplace where a large number of people perform their work in an enclosed space and wearing masks for a long time have become a pain. It was analyzed that 9 out of 10 office workers who wear masks in a limited space feel uncomfortable wearing masks (Park, 2020).

## 2.2. Research Design and Participants

### 2.2.1. Measurement of Skin Type and Skin Care Behavior

In the study, the definition of skin type and skin care behavior is as follows. Skin types were classified into neutral skin, dry skin, oily skin, complex skin, sensitive skin, and acne skin, and the oil condition of the skin has no oiliness, less oiliness, and only the T-ZONE area has oiliness, is suitable, and shiny. The moisture condition of the skin is suitable without feeling any pull, not feeling any pull, partially dry, and the skin is becoming dry. Current exfoliation conditions are very small, small, moderate, many, very exfoliated, no skin trouble, sometimes, usually, often, now no acne, sometimes, usually, often, very often. Problems with skin problems include pigmentation, wrinkles, and skin elasticity. Currently, the number of skin care rooms is measured more than 1 to 2 times.

### 2.2.2. Measurements of stress levels.

The perceived stress level was evaluated using the stress awareness scale PSS-10. Looking at the previous research paper on the Korean version of the stress awareness scale PSS (Lee et al., 2012), the Korean version of the stress awareness scale was analyzed as a stress-related factor and a stress control factor. The Korean version of the stress awareness scale was used in this study after it was confirmed that it was a tool with proven validity and reliability by evaluating the level of subjectively aware stress. PSS was developed by Cohen et al. in 1983 as a 14-question questionnaire that evaluates subjects' experiences of stress on a 5-point Likert scale over the past month, and its validity and reliability were proven (Cohen, 1983), and Cohen et al. in 1988 have been revised to 4 and 10 questions. PSS has been translated and used in countries such as Japan, Arab, China, and Spain (Cohen, 1983; Lee et al., 2012), and the level of stress awareness was evaluated in this study using

the stress awareness scale (PSS-10). This is a 10-item questionnaire, and PSS-10 is used to evaluate adult stress levels and all participants received self-fillable questionnaires, with a total score ranging from 0 to 40 points, meaning that the higher the score, the higher the stress awareness scale.

### 2.2.3. Covariates

We controlled socio-demographic and socio-economic covariates in our analysis. Sociodemographic factors were age (20-29 years old, 30-39 years old, 40-49 years old, 50-59 years old, 60 years old or older) and gender (female and male). Socioeconomic factors were academic background (middle school, high school, college, graduate or higher), occupation (housewife, office, professional, manager, salesman, engineer, mechanical worker, other/unemployed), marriage. Yes, No, and Other/Unknown. The geographical location of the residence was divided into the metropolitan area and the non-metropolitan area.

## 3. Research Methods

### 3.1. Subject to Investigation

This study was divided into socio-demographic factors and socio-economic factors, which are general characteristics, for men and women aged 20 to 60 nationwide, and was conducted as a survey on other residences and beauty management. Gender, age, socioeconomic factors, occupation, education, marital status, income, and geographical location of residence were classified into large cities and small cities, and the cost of beauty management, frequently used beauty services, and types of beauty products were self-written as skin care behavior factors. The survey distribution method was conducted through an online survey (Naver form), and the data collection period was five days from July 26 to July 30, 2022. A total of 516 data were collected, and the collected data were included in the analysis model. The collected data were not reviewed separately because it was judged that it was not necessary to be deliberated by the Institutional Bioethics Committee, and the degree of stress awareness was used as a questionnaire of the Korean version of the stress awareness scale.

### 3.2. Research Design and Analysis Methods

#### 3.2.1. Research Model

Due to the prolonged wearing of masks due to COVID-19, there may have been changes in skin conditions and skin care behaviors by skin type. Therefore, this study is a cross-sectional study to investigate the effects of skin type and

skin care behaviors during the COVID-19 pandemic and the correlation between skin type and skin care behaviors and stress. The research model designed for the purpose of the study is shown in <Figure 1>

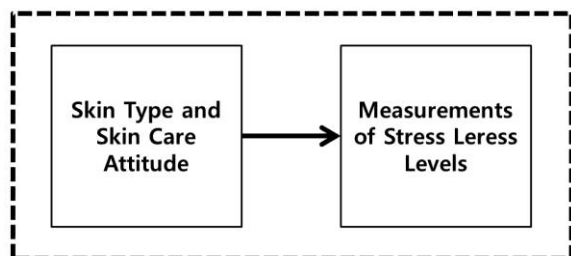


Figure 1: Study Figure

### 3.2.2. Data Analysis

Data cleaning The Statistical Package for the Social Sciences (SPSS) WIN 25.0 package was used, and statistical significance was tested at the  $p < .05$  level. Frequency analysis was conducted to find out the characteristics of the survey subjects, skin types, and skin care behaviors, and a chi-square test was conducted to examine the differences in skin types and skin care behaviors according to the characteristics of the survey subjects. In addition, independent samples t-test and one-way analysis of variance (ANOVA) were conducted to examine the differences in stress perception according to the characteristics of the subjects, skin type, and skin care behavior, and multiple regression analysis was conducted to examine the effects on stress perception, and this study was confirmed with significant  $p < .05$ ,  $p < .01$ , and  $p < .001$ .

## 4. Results

### 4.1. General Characteristics of Study Participants

Frequency analysis was conducted to analyze the characteristics of the survey subjects, and is shown in <Table 1>. Sociodemographic factors were classified by gender and age, with 352 women (68.2%) and 164 men (31.8%) in gender, 157 people (30.4%) in their 30s, and 123 people (23.8%) in their 40s, 106 (20.5%) in their 50s, 86 (16.7%) in their 20s, and 44 (8.5%) in their 60s or older. Due to socioeconomic factors, jobs, education, marital status, and income were bent, followed by office jobs with 120 (23.3%), followed by 102 professional jobs (19.8%), 90 sales service jobs (17.4%), 80 others (15.5%), 59 students (11.4%), 49 housewives (9.5%), and 16 technical jobs (3.1%).

University graduates accounted for 272 (52.7%), followed by 142 (27.5%), 91 graduate or higher (17.6%), 11

middle school graduates (2.1%), 267 married (51.7%), 219 unmarried (5.8%) and 30 others (5.8%). As for the area where they live, the metropolitan area of Seoul metropolitan area was the largest with 385 (74.6%), followed by 94 small and medium-sized local cities (18.2%), 21 others (4.1%), and 16 rural areas (3.1%). As for the cost of beauty management behavior, 234 people (45.3%) with less than 100,000 won, 110 people (21.3%) with less than 100,000 won, 84 people (16.3%) with less than 200,000 won, 49 people (9.5%) with less than 300,000 won, and 39 people with more than 400,000 won (7.6%). Hair care services were 228 (44.2%), followed by 195 (37.8%), 52 (10.1%), 30 (5.8%) nail care services, and 11 (2.1%), and 326 (63.2%) were found to be hair products (22.5%), diet products (32.1%), and makeup products (31.0%). Among the survey subjects, 68.2% were women, 54.2% were in their 30s and 40s, 52.7% were college graduates, and 74.6% were in the metropolitan area, while 45.3% spent less than 100,000 won a month for beauty management behavior. General characteristics of study participants are shown in Table 1. Women accounted for 68.2% ( $n=352$ ). 164 people (31.8%) in their 20s were higher than men (16.7%), 157 people (30.4%), 123 people (23.8%), 106 people in their 50s (20.5%), and 44 people (8.5%) in their 60s or older. By job category, 120 office workers (23.3%), 102 professionals (19.8%), 90 sales service (17.4%), 80 others (15.5%), 59 students (11.4%), 49 housewives (3.5%), 385 technical workers (74.6%), By final education level, 272 college graduates (52.7%), 142 high school graduates (27.5%), 91 graduate school (17.6%), 11 middle school graduates (2.1%), 267 married (51.7%), 219 unmarried (42.4%), and 30 others (5.8%). By income category, 78 people (15.1%) with less than 1 million won (17.4%) with 90 people (17.4%) with less than 2 million won (24.8%), 104 people (20.2%) with more than 4 million won (20.2%), 51 people with less than 100,000 won (9.9%) with less than 2 million won (14.3%). In terms of major beauty-related services, hair care services accounted for the largest portion with 228 (44.2 %), followed by 195 (37.8 %), 52 (10.1 %), nail care services with 30 (5.8 %), makeup products with 326 (63.2 %), and makeup products with 31 % (Table 1).

### 4.2. Differences in Stress Perception According to General Characteristics

An independent sample t-test and a one-way variance analysis (ANOVA) were conducted to examine the difference in perception of stress according to the characteristics of the survey subjects, as shown in <Table 2>. In terms of gender, women averaged 19.30 ( $SD=4.95$ ), higher than men 18.65 ( $SD=5.99$ ), but there was no significant difference. terms of age, 30-40 years old was the highest at 20.62 ( $SD=5.34$ ) and the lowest at 17.42

(SD=5.25) for 50-59 years old, and there was a significant difference ( $F=7.504, p<.001$ ). For jobs, the average of housewives was the highest at 20.43 (SD=4.61), and for professional jobs, it was the lowest at 18.33 (SD=6.15), and there was no significant difference. In the final educational background, the average of middle school graduates was the highest at 20.82 (SD=1.78), the lowest at 18.86 (SD=6.07) above graduate school, and there was no significant difference. Single people were the highest at 19.99 (SD=5.26), other 18.23 (SD=3.84), and there was a significant difference ( $F=5.557, p<.01$ ). In the case of income, KRW 200-3 million was high at an average of 20.90 (SD=4.13), and KRW 4-5 million was low at 17.55 (SD=4.53), showing a significant difference ( $F=4.862, p<.001$ ). The residential area was the highest at 19.94 (SD=4.71) in rural areas, and the lowest at 17.38 (SD=8.15), so it was not a significant difference. The monthly expenditure cost of beauty management behavior was the highest at 19.68 (SD=5.23), and 300,000 to 400,000 won was the lowest at 17.08 (SD=6.68), indicating a significant difference ( $F=3.241, p<.05$ ). For beauty-related services mainly used, hair care services were the highest with 19.53 (SD=5.24) points, and makeup services were the lowest with 18.36 (SD=4.41 points), and there was no significant difference. As a type of beauty product mainly used, diet products were the highest at 20.94 (SD=6.49) and nail products at 17.55 (SD=4.63), but there was no significant difference. Therefore, the difference in stress perception according to the characteristics of the survey subjects is age ( $F=7.504, p<.001$ ), Married with 001) ( $F=5.557, p<.01$ ), income ( $F=4.862, p<.001$ ), monthly expenditure on beauty management behavior ( $F=3.241, p<.05$ ) A significant difference was confirmed in 05), but there was no significant difference in gender, occupation, final education, residential area, main-use beauty-related services and main-use beauty product types (Table 2).

**Table 1:** General characteristics of study participants.

Division		frequency (n)	percentage (%)
Gender	Female	352	68.2
	Man	164	31.8
Age	20-29	86	16.7
	30-39	157	30.4
	40-49	123	23.8
	50-59	106	20.5
	Over 60	44	8.5
	Student	59	11.4
Occupation	Housewife	49	9.5
	Desk job	120	23.3
	Profession	102	19.8

	Sales service position	90	17.4
	Craft job	16	3.1
	Other	80	15.5
Residence	Seoul metropolitan area	385	74.6
	Local and small town	94	18.2
	Rural area	16	3.1
	Other	21	4.1
Education level	Middle school graduate	11	2.1
	High school graduate	142	27.5
	College graduate	272	52.7
	Graduate school or higher	91	17.6
Marital status	Single	219	42.4
	Married	267	51.7
	Other	30	5.8
Income	Less than 100-200 million won	78	15.1
	Less than 200-300 million won	90	17.4
	Less than 300-400 million won	128	24.8
	Less than 400-500 million won	65	12.6
	5 million won or more	104	20.2
	Other	51	9.9
Beauty Management Behavior Monthly Expenditures	100,000 won	234	45.3
	Less than 10-20 million won	110	21.3
	20-30 thousand won	84	16.3
	30-40 thousand won	49	9.5
	400,000 won	39	7.6
Main use Beauty related services	Skin care service	195	37.8
	Hair care service	228	44.2
	makeup service	11	2.1
	body shape management service	52	10.1
	nail care service	30	5.8
	skin products	326	63.2
Main use beauty product types	hair products	116	22.5
	makeup products	31	6.0
	diet products	32	6.2



nail products	11	2.1
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**Table 2:** Differences in Stress Perception According to General Characteristics

Division		N	Stress perception		
			Average	Standard deviation	t / F
Gender	Female	352	19.30	4.95	1.295
	Male	164	18.65	5.99	
Age	20-29(a)	86	19.71	5.83	7.504*** (d<a,b)
	30-39(b)	157	20.62	5.34	
	40-49(c)	123	18.61	4.94	
	50-59(d)	106	17.42	5.25	
	60 years old (e)	44	17.77	3.40	
Occupation	Student	59	18.93	6.44	1.256
	Housewife	49	20.43	4.61	
	Office type type	120	19.33	4.78	
	Professional work	102	18.33	6.15	
	The sale service-sector jobs	90	18.54	5.37	
	The function type of occupation	16	18.69	2.91	
Highest level of education	Others	80	19.68	4.54	0.480
	Junior high school	11	20.82	1.78	
	High school sleep	142	18.98	5.17	
	College graduate	272	19.15	5.21	
	graduate school or higher	91	18.86	6.07	
The marriage existence and nonexistence	Single (a)	219	19.99	5.26	5.557** (b,c<a)
	Married person (b)	267	18.45	5.40	
	Others (c)	30	18.23	3.84	
Income	100-200 million won (a)	78	19.17	5.87	4.862*** (d,e<b,f)
	200-300 million won (b)	90	20.90	4.13	
	300-400 million won (c)	128	19.08	4.76	
	400-500 million won (d)	65	17.55	4.53	
	Over 5 million won (e)	104	17.89	6.17	
	Others (f)	51	20.20	5.58	
Residential district	Seoul metropolitan area	385	18.96	5.22	1.588
	Local and small town	94	19.85	4.93	
	Rural area	16	19.94	4.71	
	Others	21	17.38	8.15	
Beauty management action Monthly expenditure	Less than 100,000 won (a)	234	19.68	5.23	3.241* (d<a,b)
	10 to 200 million won (b)	110	19.51	4.50	
	20-30,000 won (c)	84	18.36	5.08	
	30-40 million won (d)	49	17.08	6.68	
	Over 400,000 won (e)	39	18.46	5.81	
Weekly beauty Relevant service	Skin care service	195	18.85	5.33	0.753
	Hair management bis	228	19.53	5.24	
	Makeup service	11	18.36	4.41	
	Body type management service	52	18.52	5.64	
	Nail management service	30	18.60	5.46	
Shared beauty product type	Skin product	326	19.30	5.20	2.199
	Hair product	116	18.19	5.16	
	Makeup product	31	18.87	5.48	
	Diet product	32	20.94	6.49	
	Nail product	11	17.55	4.63	

\*p&lt;.05, \*\*p&lt;.01, \*\*\*p&lt;.001

### 4.3. Differences in Stress Perception According to Skin Condition and Skin Care

<Table 3> shows the results of independent sample t-test and one-way analysis of variance (ANOVA) to examine the difference in stress perception according to skin conditions and skin care. Among skin types, combination skin had the highest mean of 20.02 (SD=5.44) points, and normal skin had the lowest mean of 17.14 (SD=5.00) points, showing a significant difference (F=3.002, p<.01). The oil condition was the highest at 20.40 (SD=6.19) when it was oily and shiny, and the lowest at 16.65 (SD=3.81) when there was no oil at all, showing a significant difference (F=6.889, p<.001). The average skin moisture condition was the highest with 21.93 (SD=4.27) points when there was a lot of pulling, and the lowest was 17.84 (SD=5.70) points when there was no pulling at all, showing a significant difference (F=5.643, p<.001), Current dead skin condition was the highest at 21.00 (SD=6.02) points for the skin with a lot of dead skin cells, and the lowest at 17.75 (SD=6.61) points for the very little skin, showing a significant difference (F=3.674, p<.01). The average score was the highest at 21.06 (SD=6.15) when skin troubles occurred very often, and the lowest at 16.33 (SD=4.91) when there was no skin trouble, showing a significant difference (F=10.407, p<.001), The highest score was 21.53 (SD = 6.56) if acne was present frequently, and the lowest score was 17.29 (SD = 4.70) if not at all, showing a significant difference (F = 8.489, p <.001). Among skin concerns, acne was the highest with an average of 20.65 (SD=6.39) points, and others were the lowest with 13.42 (SD=5.72) points, showing a significant difference (F=7.261, p<.001). The highest score was 20.54 (SD = 4.39) points when washing face once, and the lowest score was 17.09 (SD = 5.36) points when more than 4 times, but there was no significant difference. Exfoliation 3 times or more per week was the highest with an average of 19.65 (SD=5.59) points, and 0 times a week was the lowest with 18.32 (SD=5.55) points, showing a significant difference (F=3.346, p<.05), the highest score was 21.67 (SD=5.36) when the number of times the skin care room was used was 3 or more times a week, and 1-2 times a week was the lowest at 18.49 (SD=4.64), showing a significant difference (F=4.445), p<.05), the highest score was 21.33 (SD=3.52) for pigmentation, and the lowest score was 17.59 (SD=4.53) for upper/lower body and abdominal care, but a significant difference was not.(Table 3)

**Table 3:** Differences in Stress Perception According to Skin Condition and Skin care

skin condition and skin care	N	stress	
		M±SD	t/F

Skin type	Normal skin (a)	85	17.14±5.00	3.002** (a<d)
	Dry skin (b)	110	19.45±4.96	
	Oily skin (c)	61	19.05±5.21	
	Combination skin (d)	163	20.02±5.44	
	Sensitive skin (e)	48	18.83±4.47	
	Acne skin (f)	32	19.16±6.31	
	Other (g)	17	18.24±6.27	
Oily skin condition	Oiliness at all (a)	17	16.65±3.81	6.889*** (a<c,e)
	Less oily (b)	111	19.95±4.57	
	Oil only in the T-ZONE area (c)	119	20.06±5.23	
	Oiliness is moderate (d)	201	17.81±5.22	
Skin moisture level	It is oily and shiny (e)	68	20.40±6.19	5.643*** (a<e)
	does not pull at all (a)	67	17.84±5.70	
	Moderate without pulling (b)	193	18.13±5.36	
	Partially pull (c)	201	19.98±4.63	
	Pull (d)	41	20.32±6.54	
Current skin condition	Pull a lot (e)	14	21.93±4.27	3.674** (a<d,e)
	Very little (a)	51	17.75±6.61	
	Less (b)	132	19.36±4.29	
	Normal (c)	258	18.68±5.21	
Skin trouble condition	A lot (d)	70	21.00±6.02	10.407*** (a<d)
	Very keratinous (e)	5	20.00±2.74	
	None (a)	92	16.33±4.91	
	Occurs occasionally (b)	184	19.62±4.51	
	Normal (c)	121	18.77±4.08	
Current acne condition	Occurs frequently (d)	86	20.60±7.10	8.489*** (a<d)
	Occurs very often (e)	33	21.06±6.15	
	None (a)	137	17.29±4.70	
	Occurs occasionally (b)	182	19.37±4.59	
	Normal (c)	91	19.09±5.17	
Problems among skin concerns	Occurs frequently (d)	74	21.53±6.56	7.261*** (h<e,f,g)
	Occurs very often (e)	32	19.56±6.29	
	Pigmentation (a)	100	19.62±4.90	
	Wrinkles and reduced skin elasticity (b)	140	18.05±4.24	
	Pores (c)	82	19.65±5.03	
	Capillary dilation, erythema (d)	31	19.16±4.09	
	Acne (e)	103	20.65±6.39	
Excess sebum (g)	Keratin and dryness (f)	25	20.00±5.16	
		9	20.00±4.12	

	Other (h)	26	13.42±5.72	
<b>Current face wash</b>	1 time	54	20.54±4.39	2.091
	twice _	376	18.89±5.47	
	3 times	75	19.32±4.91	
	4 times or more	11	17.09±5.36	
<b>Current exfoliation</b>	0 times / week (a)	195	18.32±5.55	3.346* (a<b,c)
	1-2 times / week (b)	287	19.55±5.05	
	3 or more times / week (c)	34	19.65±5.59	
<b>Number of visits to the current skin care room</b>	0 times / week (a)	313	19.20±5.59	4.445* (b<c)
	1-2 times / week (b)	176	18.49±4.64	
	3 or more times / week (c)	27	21.67±5.36	
<b>The current skin care room</b>	Not used	283	19.02±5.69	1.967
	Pigmentation	39	21.33±3.52	
	Wrinkles and skin elasticity	80	18.31±4.18	
	Pore	39	18.33±5.05	
	Capillary dilation , erythema	14	19.07±4.45	
	Acne	33	20.61±5.94	
	Keratin and dryness	11	18.91±6.71	
	Upper / lower body and abdominal care	17	17.59±4.53	

SE=1.053, p=0.0004) were more likely to have higher stress levels. For current acne conditions, participants occasionally occur (=1.703, SE=0.608, p=0.005), moderate (=2.486, SE=0.708, p=0.001), and frequent (=3.639, SE=0.782, p<.0001), very often (=4.467, SE=1.033, P<.0001), Those who answered had higher stress levels than those who did not have acne. For skin problems, wrinkles and decreased skin elasticity (=2.067, SE=1.047, p=0.049), capillary expansion/reduction (=3.939, SE=1.268, p=0.002), acne (=4.664, SE=1.069, p<.0001), exfoliation and drying (=3.953, SE=1.337, and p=0.003) were more likely to have a higher stress index than other skin. More people washed their face once a day (=1.973, SE=0.719, p=0.006), and three times (=1.328, SE=0.640, p=0.039). Stress levels are higher than those of individuals who wash their faces twice. Those who visited the skin care room once or twice had higher stress levels than those who had never visited (=1.755, SE=0.461, p=0.0002). covariates in our analysis. Sociodemographic factors were age (20-29 years old, 30-39 years old, 40-49 years old, 50-59 years old, 60 years old or older) and gender (female and male). Socioeconomic factors were academic background (middle school, high school, college, graduate or higher), occupation (housewife, office, professional, manager, salesman, engineer, mechanical worker, other/unemployed), marriage. Yes, No, and Other/Unknown. The geographical location of the residence was divided into the metropolitan area and the non-metropolitan area (Table 4).

#### 4.4. Factors Associated with Perceived Stress

The results of multi-linear regression analysis are shown in <Table 4>. After correction of the covariate (correction model), dry skin (=2.157, SE=0.713, p=0.003), composite skin (=2.340, SE=0.676, p=0.001), sensitive skin (=1.852, SE=0.844, p=0.029), and acne skin (=2.864, SE=1.042, p=0.006) were higher than neutral skin. Skin oil conditions are low in oil (=2.172, SE=0.567, p<.0001), only the T-zone portion had more oil (=1.953, SE=0.595, and p=0.001). It was confirmed that the stress level was higher than that of moderate oily skin. On the other hand, the stress level of participants without oily skin (=−3.588, SE=1.193, p=0.003) was significantly lower than that of moderate oily skin. Participants (=1.837, SE=0.686, p=0.008) who responded that they were not dry at all under skin moisture are partially dry (=3.118, SE=0.496, p<.0001), dry (=2.605, SE=0.820, p=0.002), and very dry (=3.146, SE=1.315, p=0.017) had significantly higher stress levels than normal skin that did not feel dry. Currently, people with less dead skin cells (=1.435, SE=0.542, p=0.008), people with more dead skin cells (=2.470, SE=0.661, p=0.0002), and people with very many dead skin cells (=7.699, SE=2.157, p=0.0004) had higher stress levels than normal skin. In the case of skin trouble, people who occur frequently (=3.014, SE=0.796, p=0.0002) and people who occur very often (=3.746,



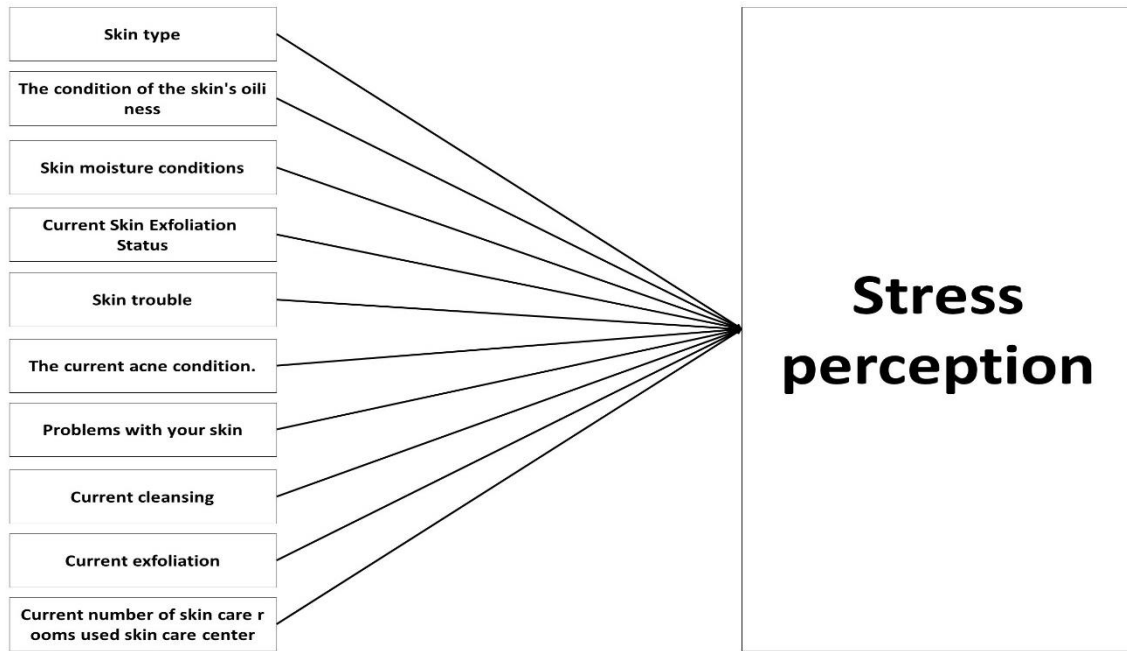


Figure2: Factors associated with perceived Stress.

Table 4: Factors associated with perceived Stress.

Variables	Unadjusted model			Adjusted model*		
	$\beta$	SE	p-value	$\beta$	SE	p-value
<b>Skin type</b>						
Dry skin	1.791	0.694	0.010	2.157	0.713	0.003
Oily skin	0.515	0.807	0.524	0.762	0.870	0.382
Complex skin	2.752	0.643	<.0001	2.340	0.676	0.001
Sensitive skin	1.732	0.868	0.047	1.852	0.844	0.029
Acne-prone skin	4.139	0.997	<.0001	2.864	1.042	0.006
Etc.	-1.400	1.278	0.274	-1.295	1.321	0.328
Neutral skin	Reference			Reference		
<b>The condition of the skin's oiliness</b>						
Have no oil at all	-3.888	1.203	0.001	-3.588	1.193	0.003
Be less oily	2.007	0.563	0.0004	2.172	0.567	<.0001
Only the T-ZONE area has oiliness	2.549	0.551	<.0001	1.953	0.595	0.001
It's oily and oily	1.862	0.668	0.006	1.173	0.679	0.085
The oiliness is moderate	Reference			Reference		
<b>Skin moisture conditions</b>						
Skin doesn't feel dry at all	0.892	0.681	0.191	1.837	0.686	0.008
Skin is partially dry	2.713	0.484	<.0001	3.118	0.496	<.0001
Skin is getting dry	3.036	0.825	0.0003	2.605	0.820	0.002
Skin is really dry	2.494	1.328	0.061	3.146	1.315	0.017
Skin doesn't feel tight and it's just right	Reference			Reference		
<b>Current Skin Exfoliation Status</b>						
It's a lot less	0.892	0.681	0.191	-0.442	0.785	0.574
Be on the small side	2.713	0.484	<.0001	1.435	0.542	0.008
There are a lot	3.036	0.825	0.0003	2.470	0.661	0.0002
I have a lot of dead skin cells	2.494	1.328	0.061	7.699	2.157	0.0004
Be commonplace	Reference			Reference		
<b>Skin trouble</b>						
Get sometimes.	1.739	0.614	0.005	1.228	0.653	0.061
Normal	1.366	0.665	0.040	1.298	0.689	0.060
A frequent.	3.770	0.721	<.0001	3.014	0.796	0.0002
A very often.	4.115	0.975	<.0001	3.746	1.053	0.0004
Not at all	Reference			Reference		
<b>The current acne condition.</b>						

Get sometimes.	2.448	0.532	<.0001	1.703	0.608	0.005
Normal	2.762	0.636	<.0001	2.486	0.708	0.001
A frequent.	4.602	0.679	<.0001	3.639	0.782	<.0001
A very often.	4.727	0.924	<.0001	4.467	1.033	<.0001
Not at all	Reference			Reference		
<b>Problems with your skin</b>						
Pigmentation	2.448	0.532	<.0001	2.087	1.085	0.055
Wrinkles and reduced skin elasticity	2.762	0.636	<.0001	2.067	1.047	0.049
Pores	4.602	0.679	<.0001	1.802	1.132	0.112
Capillary dilatation, redness	4.727	0.924	<.0001	3.939	1.268	0.002
Acne	4.602	0.679	<.0001	4.664	1.069	<.0001
Exfoliation and dryness	4.727	0.924	<.0001	3.953	1.337	0.003
Excess sebum	4.727	0.924	<.0001	1.591	1.840	0.388
Etc.	Reference			Reference		
<b>Current cleansing</b>						
A one-time wash	1.194	0.718	0.097	1.973	0.719	0.006
Wash your face three times	1.392	0.624	0.026	1.328	0.640	0.039
Wash your face more than 4 times	0.593	1.510	0.695	0.810	1.489	0.587
A two-time wash	Reference			Reference		
<b>Current exfoliation</b>						
1-2 times/weeks	1.736	0.454	0.0001	1.755	0.461	0.0002
More than three times/weeks	0.314	0.909	0.730	0.558	0.898	0.535
Zero times/week	Reference			Reference		
<b>Current number of skin care rooms used skin care center</b>						
1-2 times/weeks	0.875	0.466	0.061	0.835	0.506	0.100
more than three times/weeks	0.102	0.992	0.918	-0.031	0.966	0.974
Zero times/week	Reference			Reference		

\*Multiple regression models were performed adjusting for age, gender, occupation, residence, education level, marital status, income, and beauty management behaviors.

## 5. Discussion and Consideration

The reason for planning this study was that the stress situation caused by COVID-19 was expected to exceed the range of anxiety that individuals could endure as an unprecedented long-term stress situation that they had never experienced before (Han, 2021). Until now, COVID-19 has shown no signs of ending, so wearing a mask is continuous, and as a result, skin problems caused by wearing a mask have been caused, but direct attempts and related research to solve it are insufficient. COVID-19, which has spread rapidly since the first outbreak in Wuhan and has become a pandemic worldwide, has a huge impact on society as a whole. Due to the nature of the disease, COVID-19 has many similarities to SARS and Middle East Respiratory Syndrome (MERS), which have already been prevalent in the past, and humans are not free from other types of new infectious diseases in the future.

During the pandemic of new infectious diseases, it can be said to be a kind of infectious disaster because it has to fight the disease without knowing the fatality rate, transmission power, and treatment, and unlike typhoons, floods, and various accident accidents, it can be more difficult to estimate the size of damage if it lasts for a long time. Accordingly, we tried to review and study related literature on the impact of COVID-19 on mental health in our society as a whole. During

the ongoing COVID-19 pandemic, most people tried to investigate self-skin awareness and skin beauty behavior through long-term mask-wearing experiences that people acted to protect their health. In academia, efforts are being made to determine the impact of COVID-19 on the mental health of members of society. There were many references supporting this paper, but there were many skin diseases, especially related to the COVID-19 pandemic (Akl et al., 2021).

It contains information on all skin lesions and stress caused by the COVID-19 pandemic. Although many studies are being conducted, there have not been many studies so far, and among them, there were quite a few contents contrary to or contradict the hypothesis of the paper written by the author. Among them, it was the most noticeable in this literature. COVID-19 Vaccine: Comparison of Pfizer/Biological and Pharmacological Properties and Side Effects N Tech and Moderna Vaccine. Rather than the side effects of COVID-19, it explains the side effects and stress of the COVID-19 vaccine, and (Meo et al., 2021) the side effects and stress of the skin seen in the COVID-19 Pandemic. The results of the study are as follows. Looking at the meaningful parts of the results, people generally think of their skin subjectively according to the type of skin that is divided, and the exact and accurate way of dividing them is not popularized. As the research progressed, it was possible to conduct research on subjective skin types under a new theme in the

statistical process, and the contents of the references were summarized as follows. Since there is no objective way to standardize the classification of skin types, it was found that they are subjectively thinking about their skin according to the commonly distinguished skin types. In addition, it secretes various amounts of sebum in various regions, and individuals tend to underestimate their sebum secretion, and accurate skin condition evaluation is required to select products suitable for various skin types and skin care (Qin et al., 2020). Looking at the relationship between skin care attitude and stress by skin type, there have been studies on satisfaction and self-esteem in appearance care, skin care, and cosmetics purchasing behavior during the COVID-19 Pandemic (Park, 2021; Bae, 2021; Ahn, 2022).

The psychological utility of beauty care behavior was found to have a positive and significant effect on psychological well-being and physical respect, and both psychological well-being and physical respect showed a positive and significant influence on stress relief. In the relationship between psychological efficacy and stress relief of beauty care behavior, positive effects appeared in both psychological well-being and physical respect, so it was referenced that beauty management behavior plays a positive role in alleviating anxiety and depression (Kim & Jeong, 2021). Despite the anxiety caused by COVID-19, beauty management is conducted through home care in terms of personal hygiene and image management. In this study, people who were less interested in skin care or stressed by changes were frequently surveyed for a long time (Han & Jeong, 2022). When designing the first study, it was performed within the scope of not deviating significantly from the expected hypothesis, but there were also unexpected results or results. It was often seen that the figure was not as large as expected, and there were many data showing slightly different parts from the author's hypothesis. If you look closely, it is as follows. The frequency of related skin diseases increased as PPE use and hygiene measures (hand sanitizer gel, hand washing) were mandatory as well as skin diseases or dermatitis caused by wearing masks for a long time during the COVID-19 pandemic.

There are various findings such as skin rashes and rashes caused by the virus infection itself. New signs of skin rashes are regularly reported, although the virus has not yet shown skin affinity. The most commonly described skin symptoms are two dilatations, such as frostbite or frostbite. Hemispherical rashes are the second most common skin findings associated with viral infections and have been reported from several sources. Another reported skin symptom is herpesvirus and infectious herpes zoster or blister rash, described in several reports as blister rash, and appears to be associated with concentrated or papillary lesions. An additional skin finding associated with viral infection is a rash with hives. Many reports have identified benign urticaria lesions (Zara et al., 2021). The purpose

is to check the difference in stress perception and the effect of stress on the perception of stress that can change according to the skin type and skin care behavior of Koreans due to wearing masks during the COVID-19 pandemic, and the stress level was evaluated using the stress awareness scale (PSS-10). The reason for designing the study was that the stress caused by COVID-19 was expected to continue in an unprecedentedly long situation beyond the range of psychologically manageable anxiety (Han, 2021), so the author thought the study would be worth it. Therefore, for a study on the effect of COVID-19 on mental health of our society as a whole, we reviewed the relevant literature and examined people's perception of skin and skin care behavior by referring to it. First, looking at the research results, the difference in skin type according to the characteristics of the survey subjects is income ( $p < .01$ )

We also founded significantly differences in stress perception based on all items of skin condition and care, excluding face wash and the current skin care room. The correlation between skin type, skin care behavior, and stress perception is that the difference in stress perception is between skin type and current skin keratin ( $p < .01$ ), skin moisture, skin oil, skin trouble, acne condition, and skin concerns ( $p < .001$ ), and it was confirmed that there was a significant difference between exfoliation and the number of use of the skin care room ( $p < .05$ ), but there was no significant difference between the number of washing and the reason for use of the skin care room. In addition, the effects of stress perception on each skin type were higher in dry skin ( $=2.157$ ,  $SE=0.713$ ,  $p=0.003$ ), complex skin ( $=2.340$ ,  $SE=0.676$ ,  $p=0.001$ ), sensitive skin ( $=1.852$ ,  $SE=0.844$ ,  $p=0.029$ ), and acne skin ( $=2.864$ ,  $SE=1.006$ ). Due to the nature of the disease, COVID-19 has many similarities with SARS and Middle East Respiratory Syndrome (MERS), and humans cannot be free from other forms of infectious diseases in the future, and each time these infectious diseases are prevalent, fatigue and depression increase due to skin type stress, and quality of life is significantly lower than before (Akl et al., 2021).

Therefore, sufficient attention and management will be needed for stress. Depending on the type of skin, one can subjectively judge one's own skin, and the method of accurately classifying it has not become popular. However, those who had low satisfaction with skin types and skin care behaviors showed high interest due to stress caused by external environments such as COVID-19. Since it is not clear how to standardize skin types, one often judges one's skin from a subjective perspective, but the amount of sebum secreted by individuals or skin types and the measure of stress varies, so it is necessary to evaluate the exact skin type to minimize stress. Changes in lifestyle, skin type, skin care behavior, and cosmetics use after COVID-19 (Bae, 2021) are required, and sufficient sleep can also maintain healthy skin to minimize stress.

## 6. Conclusion

In this study, a survey was conducted on 516 adult men and women aged 20 to 60 years old to identify differences in skin type and skin care behavior according to the COVID-19 period and to find out stress perception according to changes in skin type. Based on the survey statistics, it was found that the explanatory power of the final model was appropriate, and there was no problem with independence assumptions and multicollinearity, so it could be evaluated as an appropriate study. The skin can react sensitively to various environments and all physical stimuli. In addition, stress is attracting attention as a cause and exacerbation factor of various diseases, and it can have difficulty in normal life due to poor quality of life as well as chronic diseases and lead to a contraction in activities due to social maladjustment. In addition, appropriate intervention and management of individual stress is necessary because socioeconomic cost burdens such as absence or use of medical institutions may occur directly or indirectly. Therefore, we tried to understand the degree of stress that can be caused by skin types and skin care behaviors after COVID-19.

The effect on the perception of stress was different depending on the type of skin, moisture, oil, dead skin cells, troubles, acne, skin problems, degree of cleansing, and removal of dead skin cells. In particular, the score of stress was 7.7 points higher than normal when there is a lot of dead skin, and 4.5 points higher than when there is no acne at all. Therefore, it was confirmed that there was a significant difference in stress perception according to the skin condition. It is believed that improvement of skin types, such as skin keratin conditions and acne management, among skin care behaviors can help prevent stress. In this study, it is meaningful for academic research to examine the characteristics of skin types and skin care behavior by wearing a mask during the COVID-19 epidemic, and to create evidence for intervention measures that can reduce stress levels by checking the effects on stress. This study was conducted to find out the effect of the survey subjects on stress awareness, and there are the following limitations. First, since the cross-sectional study was conducted on online participants due to COVID-19, attention should be paid to interpretation because the research results can be generalized to everyone or the temporal precedence and causal relationship of stress awareness cannot be explained.

Second, it cannot be ruled out that changes in stress awareness may occur due to other external factors. In addition, it was confirmed that after COVID-19, it could have a significant effect on stress according to skin type and skin care behavior. It is expected that the customized cosmetics and beauty self-care industry will be developed through detailed measurement and design beyond the original oil and

moisture analysis of the skin, and further research on problematic skin will be actively conducted in the future (Lee, 2021). Therefore, there are implications for the development of interventions to reduce stress. In modern society, people invest a lot of effort and time to be interested and satisfied with their appearance or skin type, given that the present study will continue to be actively conducted and contribute to meeting the needs of customers in the beauty industry.

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