INTRODUCTION

The ongoing coronavirus disease-19 (COVID-19) pandemic is endangering millions of people in more and more countries and is a serious public health threat worldwide. Recently, extensive research and clinical trials have been conducted to develop antiviral drugs, vaccines, and anti-syndromic coronavirus 2 (SARS-CoV-2) antibody treatment for the treatment of COVID-19, plasma treatment for convalescence, and nanoparticle-based treatment. As a result, the spread of the COVID-19 virus continues. A newly developed rapid point-of-care test is underway. This is contributing to controlling the spread of the COVID-19 virus by facilitating large-scale testing on the population. A population-based cross-sectional study conducted in Cantabria, Spain between April and May 2020 also evaluated the applicability of a self-testing strategy for SARS-CoV-2. In the early days of the COVID-19 outbreak, lung health was a major focus of research. Recently, COVID-19 self-diagnosis has been considered and used as a screening test tool. Vaccines and treatments have been

Good ingredients from foods to vegan cosmetics after COVID-19 pandemic

Jinkyung Lee BA1,2 | Ki Han Kwon PhD3

1Division of Beauty Arts Care, Department of Practical Arts, Graduate School of Culture and Arts, Dongguk University, Seoul, South Korea
2Daily Beauty Unit, Amorepacific Co., Seoul, South Korea
3College of General Education, Kookmin University, Seoul, Republic of Korea

Abstract

Background: New changes are taking place in the beauty and cosmetology market due to changes in daily life due to coronavirus disease-19 (COVID-19) and environmental alteration caused by the spread of live commerce.

Purpose: This study technically investigated the future value and direction of vegan cosmetics from food to cosmetics by focusing on good ingredients after COVID-19 pandemic and changing the needs of consumers in the beauty and cosmetics industry.

Methods: This review paper is a critical literature review, and a narrative review approach has been used for this study. A total of 300–400 references were selected using representative journal search websites such as PubMed, Google Scholar, Scopus, RISS, and ResearchGate, which a total of 45 papers were selected in the final stage based on 2009 to 2022.

Result: As environmental problems increased after the COVID-19 pandemic, we tried to understand the needs of consumers for vegan cosmetics, which are good ingredients and good cosmetics. Therefore, this narrative review clearly shows the need for beauty and cosmetics industry consumers to pursue good consumption due to the global COVID-19 pandemic.

Conclusion: Accordingly, this literature review will need to identify consumer needs for vegan cosmetics that started from vegan foods and develop the applications for the development of customized inner beauty products, customized vegan inner beauty products and/or customized vegan cosmetics using customized cosmetics. This is expected to be used as important marketing materials for the global vegan cosmetics market that confirms new changes in the cosmetics market.

KEYWORDS
COVID-19, good consumption, live commerce, vegan cosmetics, vegan inner beauty
developed for COVID-19, but the pandemic shows no sign of ending yet.\(^2\)

In recent years, e-commerce such as online purchase has been growing steadily, and due to this social situation, the e-commerce market is growing rapidly due to the transition to a non-face-to-face society.\(^3\) In Prof. Kim’s book, “It is not a question of who owns more, but a new measure of life’s abundance is scaled to ‘who has more experience.’” “Streaming” essentially means playing audio or video in real time without downloading it. It is called streaming because it treats data as if it were flowing through water. The most fundamental difference between streaming and downloading is ownership. The streaming is the biggest feature that you can experience whenever you want, even if you do not own it. The era of enjoying such a streaming life has arrived, and live commerce is also growing at the same time in the beauty market. It has emerged as a major trend in the industry. The service method that provides information in a non-face-to-face manner means minimizing contact with people. As we enter the unknown era, the frequency of purchasing customized cosmetics through untact mobile shopping is increasing, and research results have shown that this has a high correlation with interest in skin and perception of customized cosmetics. In the unexplored era after COVID-19, cosmetics consumption through mobile shopping is expected to increase.\(^4,5\) Unlike in the past, social media environment dominates our daily life and everything is changing rapidly, and nothing seems to change long. In a rapidly changing era, it is very meaningful socially and culturally to compare the appearance of generations who share the same emotions with the differences in perceptions of one generation.\(^6-8\) The Korean economy and the global Hallyu wave. It is necessary to diagnose the reality of the beauty industry, which has grown in importance over time, and to suggest realistic development directions. The production and use of e-commerce packaging has steadily increased in recent years due to the increase in online purchases. As a result, the impact on the environment has also increased. Humanity faces climate change, pollution, environmental degradation and/or destruction of air, soil, water, and ecosystems. The climate and environmental crisis will be one of the greatest challenges in human history. As a result, consumers become more obsessed with good consumption and good ingredients, and the trend is gradually spreading from vegan food to vegan cosmetics.\(^9,10\)

Therefore, as environmental issues have been increasing after the COVID-19 pandemic, it will be identified the needs of consumers for vegan cosmetics, which are good ingredients and good cosmetics, and focused on the future value and direction of vegan cosmetics from food to cosmetics.

2 | MATERIALS AND METHODS

This review paper is a critical literature review, and a narrative review approach has been used for this study. A total of 300–400 references were selected using representative journal search websites such as PubMed, Google Scholar, Scopus, RISS, and ResearchGate, which a total of 45 papers were selected in the final stage based on 2009 to 2022. The PRISMA flow diagram is shown in Figure S1.

3 | RESULTS

3.1 | Changes in daily life due to COVID-19 pandemic

Effective vaccines and therapeutics to prevent COVID-19 have been released. Yet the world continues to rely on social distancing, sanitation measures and repurposing drugs. The world has developed an effective SARS-CoV-2 vaccine. By the end of August 2020, 30 vaccines had already entered clinical trials, and more than 200 vaccines had undergone various stages of development. As a result, 71.5% were either “very high” or “somewhat likely” to receive the COVID-19 vaccine. 48.1% said they would follow their employer’s recommendations. The difference in acceptance rates varied from nearly 90% (China) to <55% (Russia). Respondents with higher confidence in government sources of information are more likely to be vaccinated and follow employer recommendations. As a result, many vaccinations have been carried out, but the world is still in a state of panic.\(^11,12\) A social distancing policy to spend more time at home during the COVID-19 period has been implemented.\(^13\) As a result, the transition to telecommuting has been positive for most, with potential benefits in reducing fatigue for many employees. Maintaining the option to work from home after COVID-19 can help reduce burnout in the long term. Addressing information technologies that can personalize options and ensure functionality has been found to be important for those who cannot work effectively from home.\(^14\) Telecommuting, which requires working from home rather than in a company building, is a future-oriented work method that is beneficial to both the organization and its members and is spreading widely with the development of information infrastructure. It has various advantages such as productivity increase, job satisfaction increase, cost reduction, the flexibility of work and workplace, etc., and is also important as a means of enhancing organizational competitiveness. It is expected to provide opportunities for women who have difficulties in raising children to perform work and housework at the same time at home. In the study of factors affecting attitudes toward telecommuting, the Korean Intellectual Property Office examiners’ telecommuting consciousness survey was conducted targeting examiners of the Korean Intellectual Property Office, which is the most successful government agency conducting telecommuting. The advantages of telecommuting (increased productivity, psychological freedom, and improved family relationships) all have a positive effect on the attitude toward telecommuting, and the disadvantages (creating a sense of incongruity within the organization, difficulties in managing employees by the department head, not knowing the organizational situation) was found to have a negative effect. However, compared to those who did not expect to work from home, the other three groups had a more positive attitude toward telecommuting.\(^15\)
3.2 Environmental issues due to the spread of live e-commerce

As the number of single-person households and the number of single people increases, the number of people who want to cut off the changing and inconvenient communication of life culture has increased, resulting in untact marketing in the retail industry. Here, COVID-19 quickly penetrated untact culture and trends and established untact marketing. Untact culture and untact marketing in Japan and Korea were examined through case studies, and similarities and differences were compared. The untact culture and the development of technology were combined to create novel untact marketing, but in Japan, the traditional culture of face-to-face and contact changed to an untact culture. Untact marketing using digital technology is applied in various ways in Korea. As COVID-19 continues for a long time, efforts to make untact marketing efficient in this untact culture are accelerating. The development of mobile technology is an era in which modern people have become essential in all areas of life. You can easily access various devices and concepts that makeup not only the media, but also all aspects of society and the entire culture, including popular art, music, video, art, and daily food, clothing, and shelter culture anytime, anywhere. The development of these contemporary technologies and the possibility of expansion of the untact space due to the development of mobile technology, which is universal and rapidly developing in modern society, were paid attention to. The development of mobile technology, centered on non-face-to-face, has the potential to develop into a field of untact exhibition and space design. Untact, a service that implies unmanned services such as artificial intelligence, big data, and IoT, which is the 4th industrial revolution technology, is developing into a more sophisticated and new technology. Studies on the role of smart packaging systems in the food supply chain also suggest that they can affect food quality, safety, and sustainability. Packaging systems have evolved to become smarter by integrating new electronic products with wireless communication and cloud data solutions. There are many factors that cause food loss and waste problems throughout the food supply chain. However, the development of smart packaging systems has developed recently, and there are several articles showing breakthroughs and mentioning that there are challenges for sustainability. Global warming and obesity: A systematic review study found that there was a common correlation between global warming and obesity epidemics. The following studies found: Global warming affects obesity prevalence; Obesity epidemic contributes to global warming; Global warming and obesity epidemics influence each other. Increased energy consumption affects global warming. Policies that support clean and sustainable energy sources and urban designs that encourage active lifestyles are likely to alleviate the social burden of global warming and obesity. Policies that support the deployment of clean and sustainable energy sources and urban designs that encourage active lifestyles are likely to alleviate the social burden of global warming and obesity. Table 1 summarizes environmental problems caused by the spread of live commerce.

3.3 Increasing interests in good ingredients and vegan cosmetics

As the environmental pollution caused by industrial wastes becomes more serious, veganism is emerging as a social problem. To raise awareness and responsibility for environmental protection, more consumers are turning to vegetarian cosmetics in the beauty industry. Recently, veganism is a food consumption pattern. Vegetarianism usually includes several diets depending on the degree of exclusion in part or all of animal products such as meat and dairy. Among them, flexible, semi-vegetarian, pesco-vegetarian, lacto-ovo-vegetarian, vegan, raw and fruit diets are classified in order of restriction. These last three modes can be extended to a lifestyle called veganism, which is defined as not using animal products (cosmetics, clothing, ingredients, etc.) in daily life. Due to COVID-19, research on sustainable changes in the safety-oriented beauty market trend is coming to an era where the perspective of sustainable safety can be applied to the entire beauty and cosmetics industry, and as customers’ perceptions change, safe ingredients are needed. Here, “good ingredients” means safe ingredients according to changes in customers’ perceptions. This meaning also includes environmental issues. Recently, due to the increase in the use of masks due to environmental problems or infectious diseases, skin troubles are rapidly increasing due to changes in the use of cosmetics around the world. Therefore, research was conducted to suggest natural products related to research on skin soothing ingredients and makeup products. A study on the influence of consumer decision-making style on the consumption value of vegan cosmetics is in progress. In the effect of vegan cosmetics on consumption value, the higher the prudence and compliance type among the sub-factors of consumer decision-making type, the higher the consumption value. It was found to have a significant effect on sub-factors, functional value, economic value, social value, conditional value, cognitive value, and emotional value. The purchase decision attributes, purchase behavioral intentions, and consumption values of the MZ generation of vegan cosmetics for infants and toddlers are constantly changing due to the spread of vegan cosmetics for infants and children, and various environmental and social impacts. It was found to have a significant effect on the purchase intention of vegan cosmetics as a determinant.

3.4 Good ingredients for vegan and vegan cosmetics originated from foods

Recently, research on “natural” and “vegetarian” cosmetics has been actively conducted. Table 2 summarizes the good ingredients of vegan and vegan cosmetics derived from food. Glycine max, also known as soybean or soybean, is a type of legume native to East Asia. Soybeans contain many functional components including phenolic acids, flavonoids, isoflavonoids (quercetin, genistein, and daidzein), small proteins (Bowman-Burk inhibitors, and soybean trypsin inhibitors) tannins, and proanthocyanidins. Soybean seed extract
| NO | Journal name               | Author            | Title                                                                 | Discussion                                                                                                                                                                                                 | References |
|----|----------------------------|-------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1  | Assoc Japanol East Asia    | Lee J (2021)      | Changes in Japanese consumer culture– from ownership to sharing       | As the number of single-person households and the number of single people increased, a change in living culture followed, and more and more people wanted to cut off uncomfortable communication, so untact marketing appeared in the retail industry. Here, the COVID-19 situation quickly penetrated the untact culture and trend and established untact marketing. | [16]       |
| 2  | J Cosmet Dermatol          | Lee J et al (2022)| Mobile shopping beauty live commerce changes in COVID-19 pandemic focused on fun contents of MZ generation in Republic of Korea | It will spread from the cosmetic industry, which has rapidly changed to the untact era after Corona 19, to the beauty live commerce market.                                                                            | [42]       |
| 3  | J Food Sci                 | Chen S et al (2020)| The role of smart packaging system in food supply chain              | It is a fast-growing integrated sector, and smart packaging from manufacturing, packaging, distribution, and storage can impact safety and sustainability                                                                 | [18]       |
| 4  | Obes Rev                   | An R et al (2018)  | Global warming and obesity: a systematic review                      | Global warming also directly affects obesity by food supply/price shocks and adaptive thermogenesis, and obesity epidemics also affect global warming by increasing energy consumption. Policies that support the deployment of clean and sustainable energy sources and urban designs that encourage active lifestyles are likely to alleviate the social burden of global warming and obesity | [19]       |
and fresh soymilk fraction have been reported to have cosmetic and dermatological benefits such as anti-inflammatory, collagen stimulatory effect, powerful anti-oxidant scavenging peroxyl radical activities, skin whitening and sun protective effects. Soybean isoflavone extracts have also been studied to inhibit 2,4-dinitrochlorobenzene-induced contact dermatitis. Numerous epidemiological and clinical studies have demonstrated the protective role of dietary isoflavones in the pathogenesis of several chronic diseases such as inflammatory bowel disease. A ISO-1 is promising for amelioration of DNCB-induced experimental inflammatory model and skin barrier damage, suggesting potential application of topical ISO-1 for inflammatory dermatosis. The concentration of major proteins and carbohydrates such as polysaccharides was measured by Forint phenol assay and phenol-sulfuric acid assay, respectively, in studies on the safety of black bean sprouts and cosmetics use. As a result, it was concluded that the extract of black bean sprouts is safe and can be used as an additive for anti-aging and whitening effective cosmetics. Palm olein (POo), olive oil (OO), safflower oil (SAF), grape seed oil (GSO), soybean oil (SBO) and sunflower oil (SFO), which have different saturation levels, are the main oils in the stability
evaluation study of various vegetable oil-based emulsions. As a result, it was confirmed that the saturation level of the vegetable oil had a significant effect on the emulsion stability. There is a study result that Korean red ginseng hot water extract relieved atopic dermatitis-like inflammatory response by negative regulation of the mitogen-activated protein kinase (MAPK) signaling pathway in vivo. The Korean red ginseng is a traditional Korean medicinal plant and is often consumed as foods. Increased levels and decreased serum IgE levels, epidermal thickness, mast cell infiltration and ceramidase release. Studies have been conducted on the surface activity and

| Author          | Waqas MK et al. (2015) | Teh SS et al. (2018) | Park JH et al. (2019) | Lee JM et al. (2021) | Góral I et al. (2022) |
|-----------------|------------------------|----------------------|-----------------------|----------------------|------------------------|
| Title           | Dermatological and cosmeceutical benefits of Glycine max (soybean) and its active components | Stability evaluations of different types of vegetable oil-based emulsions | Korean red ginseng water extract alleviates atopic dermatitis-like inflammatory responses by negative regulation of mitogen-activated protein kinase signaling pathway in vivo | Relationship between vegan cosmetics consumer’s planned behavior model, brand image, and purchase intention | Surface activity and foaming properties of saponin-rich plants extracts |
| Discussion      | Soybean seed extract and fresh soymilk fraction have been reported to have cosmetic and dermatological benefits such as anti-inflammatory, collagen stimulating effect, powerful antioxidant scavenging peroxyl radical, skin whitening effect and sun protection. | Palm olein (POo), olive oil (OO), safflower oil (SAF), grapeseed oil (GSO), soybean oil (SBO) and sunflower oil (SFO) with different saturation levels were studied as major components of the oil phase. It was suggested that the saturation level had a significant effect on emulsion stability. | Korean red ginseng is a traditional Korean medicine. In this study, the effect of Korean red ginseng extract (RGE) was estimated in the BALB/c mouse model for developing Alzheimer’s disease-like lesions induced by 1-chloro-2,4-dinitrobenzene (DNCB). | Due to the seriousness of environmental pollution caused by industrial waste, veganism has become an important social issue. To promote awareness and responsibility for environmental protection, more and more consumers have shown interest in vegetarian cosmetics in the beauty industry. | Forty-five plants from different families reported to be rich in saponins for their surface activity and foam properties were selected and studied. Saponaria officinalis L. (soap), Avena sativa L. (oats), Aesculus hippocastanum L. (horse chestnut), Chenopodium quinoa Willd. (quinoa), Vaccaria hispanica (Mill.) Rauschert (cowherb) and Glycine max (L.) Merr. (soybean) is proposed as the best potential source of saponins for surfactant applications in natural cosmetics and household products. |
| Journal name    | Acta Pol Pharm | J Oleo Sci | Biomed Pharmacother | J Invest Cosmetol | Adv Colloid Interface Sci |
| References      | [27] | [30] | [31] | [20] | [32] |
TABLE 4  The necessity of developing vegan cosmetic matching fusion service application

| Author          | Title                                                                                      | Discussion                                                                                     | Journal name                  | References |
|-----------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------|------------|
| Siebert AK et al. (2017) | Vitamin B-12-fortified toothpaste improves vitamin status in vegans: a 12-week randomized placebo-controlled study | Vitamin B-12 applied to the mouth via toothpaste enters the bloodstream and corrects the vitamin B-12 markers in the blood of vegans who are at high risk of vitamin B-12 deficiency. | Am J Clin Nutr              | [44]       |
| Jenkins K et al. (2020) | Concomitant phytodermatitis and allergic contact dermatitis due to "natural" and "vegan" cosmetics. Dermatitis | Due to the rapid change to a non-face-to-face society due to COVID-19, mobile shopping will increase as it is difficult to purchase cosmetics. Accordingly, a hands-on mobile app incorporating the new technology of the 4th industrial revolution should be developed. | Dermatitis                  | [26]       |
| Lee J et al. (2021) | Recognition and the development potential of mobile shopping of customized cosmetic on untact coronavirus disease 2019 period: focused on 40's to 60's women in Seoul, Republic of Korea | The definition of health sustainability, well-being and well-dying as it relates to beauty and cosmetology after the global COVID-19 pandemic is also evolving in DTC genetic testing. As a result, it was confirmed for the first time that the intake of customized inner beauty formulations and the use of customized cosmetics would be more effective. | J Cosmet Dermatol           | [4]        |
| Lee J et al. (2021) | DTC genetic test for customized cosmetics in COVID-19 pandemic: Focused on women in their 40s and 60s in Seoul, Republic of Korea | This is to suggest a service direction that can satisfy the convenience of providing product information and purchasing to users who use the vegan cosmetic matching application. Bureau of existing cosmetic applications. The service process was designed and developed in consideration of the internal and external case analysis and consumer demand for the service function of the vegan cosmetic application. | J Cosmet Dermatol           | [45]       |
| Huh Y. (2021)    | A study on development of vegan cosmetics matching convergence service application for changes in beauty consumer market |                                                                                                 | Korean Soc Sci Art          | [43]       |
foaming properties of plant extracts. Saponins are amphiphilic glyco-side secondary metabolites produced by many plants. Only a few of these have been thoroughly analyzed and far fewer have found industrial applications as bio-surfactants. In this contribution, it will be screened 45 plants from different families that were reported to be rich in saponins for their surface activity and foam properties. For this purpose, room temperature aqueous extracts such as maceration solutions of plant organs rich in saponins were prepared and spray dried under the same conditions in the presence of sodium benzoate and potassium sorbate as preservatives and drying aids. The 15 selected plants were also extracted using hot water, but the high temperature lowered the surface activity of the extract in most cases.32

4 | DISCUSSIONS

The coronavirus outbreak poses multiple challenges for people around the world to stay healthy, negotiable with disease risks and harsh social distancing measures. In the basic psychological needs, positive and negative emotions through satisfaction and frustration with autonomy, ability, and relevance, as well as life satisfaction and overall pain, were studied. It was performed from the perspective of the role of self-determination theory on a 29-year-old Serbian woman with 965 participants was used. Serbian emotion list based on basic psychological needs satisfaction and frustration scale, life scale satisfaction, depression anxiety stress scale 12, and Panas-X was used. The indirect relationship between positive and negative emotions, life satisfaction and overall pain was successively mediated by autonomy satisfaction, competence frustration, relevance satisfaction, and frustration. An important question has been raised about how the tendency to experience positive or negative emotions affects changes in subjective well-being. Consistent with the assumptions of self-determination theory, the results suggest that satisfaction and frustration with basic psychological needs may play an important role in achieving optimal well-being. Therefore, it is reported that our understanding of human functioning in special circumstances has improved during the pandemic.33,34 Schools across the world have been closed during the COVID-19 pandemic. However, there are little data on the transmission of SARS-CoV-2 in children and educational settings. Most schools in Australia continued to open during the first epidemic, despite a decline in student field attendance at the peak of the pandemic.35 A second COVID-19 pandemic risk determination modeling study was conducted in the UK with the impact of optimal strategies, testing, and follow-up interventions for school reopening. If schools open full-time in September, along with a gradual easing of school closures, the results are likely to bring a second wave that will peak in December 2020. As a result, the second wave of infection is 2.0–2.3 times the size of the original COVID-19 waves. When contagiousness in children and young adults varies from 100% to 50% in older adults, there is still a need for a comprehensive and effective follow-up and quarantine testing strategy to avoid a second COVID-19 wave.36

In this era, telecommuting has become a necessity rather than an option. Telecommuting, which was gradually expanding in Cyber-Physical Space, was further accelerated by the COVID-19 pandemic. Various organizations at home and abroad are encouraging telecommuting, and it is predicted that telecommuting will be established as a type of work based on the COVID-19 pandemic.37 With the contemporary media environment, it is necessary to pay attention to the phenomenon of the personalization of images. As the number of zero TV households increases, the number of people looking for content at their own time with computers, tablet PCs, and smartphones instead of traditional TV sets has increased rapidly. As of the current time, YouTube, and various social networking services (SNS) are the most frequently used platforms. Now, the individual goes beyond the level of viewing to the level of creation. In addition, an image interface that can be manipulated coexists with the traditional screen interface represented by a movie. In short, the use of digital devices has become so common that our daily lives can be called “screen life.”38 With millions of viewers worldwide, live streaming has a variety of social interaction features and new social media that provide real-time video content. The study aimed to understand the personality traits, motivations, and user behaviors of active live streaming viewers in the general Chinese population. As a result, extraversion was negatively associated with live streaming use, while openness was positively associated with it. The main motivations for watching live streaming were social interaction, information gathering, and entertainment, which were associated with different frequencies of use and genre selection.39

However, there are also studies that show that live streaming influences mental health and depression. Online live streaming is gaining popularity in media entertainment, and micro-celebrities such as video streamers can have a similar impact on their audience. An online survey of 470 people was conducted, and the study looked at how the streamer’s exposure to depression affects the streamer’s and viewers’ perceptions of depression. In addition, quasi-social relationships, quasi-social interactions, and identity with streamers were investigated as follows: (1) the viewer’s perceived authenticity and trust in the streamer; (2) Associated with an increase in the viewer’s perceived prevalence, risk sensitivity, and risk severity. Mental health shows a strong link between streamers’ health disclosure and public perception of depression. Mental health is also being discussed as a previous study of celebrity influence.40 Live commerce content is being strengthened throughout the beauty distribution industry. The live commerce market is growing rapidly as non-face-to-face consumption increases due to the spread of the novel coronavirus infection COVID-19. This year’s size is 3 trillion won and is expected to grow to 10 trillion won by 2023. In addition to collaborating with large companies such as Naver and Kakao corporation, their own live commerce platform is actively being developed. It also sells products planned with YouTube creators and is increasing communication with the MZ generation, a major consumer group. YouTube creators have fandom as great as idols, and the MZ generation, who are accustomed to video media, do not perceive live commerce broadcasting as a simple product purchase channel. It was a
new communication channel and pursue fun in it, and live commerce is expected to become more active in future as it can attract young customers and expand contact points.41,42 However, according to these times, electricity transport and agricultural productivity lead to excessive greenhouse gas emissions. Direct impact on obesity by influencing global warming and causing nutritional diversion and physical inactivity, by obesity epidemics, global warming, food supply, price shocks and adaptive thermogenesis. The obesity epidemic contributes to global warming due to increased energy consumption. Policies that support the deployment of clean and sustainable energy sources and urban designs that encourage active lifestyles are likely to alleviate the social burden of global warming and obesity.19 From the perspective of sustainable safety, it was said that harmful and safe edible ingredients should be comparatively analyzed from the perspective of clean beauty in a study on the overall change of the beauty industry market in the post-COVID19 pandemic. It was also said that the importance of sustainable value should be considered from the point of view of clean beauty for minimizing carbon emission, beyond raw materials, manufacturing processes, product test, customer perception, procurement of raw materials for products of sustainable value should be considered from the point of view of the post-COVID19 pandemic. It was also said that the importance of sustainable value should be considered from the point of view of clean beauty for minimizing carbon emission, beyond raw materials, manufacturing processes, product test, etc. are part of the clean beauty for minimizing carbon emission, using water, recycling product containers, and reducing waste.22 Lately, as consumers are increasingly interested in products made with safe ingredients, cosmetics that have been certified as vegan are increasing in the cosmetic market. In this situation, consumers are analyzing cosmetic ingredients or receiving information about products using various contents such as social media and applications to meet the needs for products made with safe ingredients.43 Table 3 summarizes the growing interest in good ingredients and vegan cosmetics. Results of an online survey conducted on female consumers in their 20s and 40s who are interested in vegan cosmetics. Among the sub-factors of the vegan cosmetic consumer’s planned behavioral model, attitude, subjective norm, perceived behavioral control, ethical responsibility, and self-identity were found to have a statistically significant positive effect on brand image and purchase intention., it was found that brand image had a statistically significant positive effect on purchase intention.20 Accordingly, various studies on vegan ingredients, which are good ingredients, are being conducted. The surface activity and foaming properties of plant extracts rich in saponins have been studied. As a result, depending on the overall characteristics, Saponaria officinalis L. (soap), Avena sativa L. (oat), Aesculus hippocastanum L. (horse chestnut), Chenopodium quinoa Will. (quinoa), Vaccaria hispanica (Mill.) Rauschert (cowherb) and Glycine max (L.) Merr. (Soybean) has been proposed as the best potential source of saponins for surfactant applications in natural cosmetics and household products. Vitamin B12 applied by mouth through toothpaste enters the bloodstream and corrects vitamin B12 markers in the blood of vegans at high risk of vitamin B12 deficiency. Vitamin B12 fortified toothpaste has been shown to improve vitamin status in vegans.44 In order to improve these problems and meet the needs of consumers, additional research through customized inner beauty and customized cosmetics and research on the development of vegan cosmetics matching convergence service application development according to changes in the beauty consumption market will be required.26,43,45 Table 4 summarizes the need for vegan cosmetics matching fusion service application development.

Therefore, this narrative review clearly indicates the needs of consumers in the beauty and cosmetics industry to pursue good consumption due to the COVID-19 pandemic. However, the limitation of this study is that the research on the cosmetic market because COVID-19 is not finished yet. Accordingly, it will be necessary to continue research on the possibility of developing cosmetics with safe ingredients, vegan foods, reflecting the needs of consumers in future.

### 5 CONCLUSIONS

Based on the results of this study, it will be necessary to identify consumer needs for vegan cosmetics that started from vegan food and develop applications for the development of customized vegan inner beauty products and customized vegan cosmetics using customized inner beauty products and/or customized cosmetics. This is expected to be used as an important marketing material for the global vegan cosmetics market that confirms new changes in the cosmetics market.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

### ORCID

Jinkyung Lee https://orcid.org/0000-0003-3819-3066

### REFERENCES

1. Majumder J, Minko T. Recent developments on therapeutic and diagnostic approaches for COVID-19. AAPS J. 2021;23(1):14.
2. Iruzubieta P, Fernández-Lanas T, Rasinés L, et al. Feasibility of large-scale population testing for SARS-CoV-2 detection by self-testing at home. Sci Rep. 2021;11(1):9819.
3. Scursell S, Llorach-Massana P, Roncero MB. Sustainability in e-commerce packaging: a review. J Clean Prod. 2021;280:124314.
4. Lee J, Kwon KH. Recognition and the development potential of mo- bile shopping of customized cosmetic on untact coronavirus disease 2019 period: focused on 40’s to 60’s women in Seoul, Republic of Korea. J Cosmet Dermatol. 2021;20(7):1975–1991.
5. Kim ND, Jeon MY, Lee HE, et al. Trend Korea 2018. Miraebok Publishing. 2017:314.
6. Kim ND, Jeon MY, Choi JH, et al. Trend Korea 2020. Miraebok Publishing. 2019:200.
7. Hong SH, Kim M. A study on communication methods according to the characteristics of MZ generation. Treatise Plast Media. 2021;24(1):113–120.
8. Park J, Lee J. Case study of untact (non-face-to-face) exhibition space by mobile environment. Korean Soc Spatial Design. 2020;15(4):75–85.
9. Park J, Lee JH, Kim YJ, Song YW. A descriptive study on the brief development history of K-beauty and its future directions. J Distrib Logist. 2020;7(1):73–92.
10. Lee J, Kwon KH. Why is generation MZ passionate about good consumption of K-beauty amid the COVID-19 pandemic? J Cosmet Dermatol. 2022. 10.1111/jocd.14859

11. Lazarus JV, Ratzan SC, Palayew A, et al. A global survey of potential acceptance of a COVID-19 vaccine. Nat Med. 2021;27(2):225-228.

12. Afifi TO, Salmon S, Taillieu T, Stewart-Tyfescu A, Fortier J, Driedger SM. Older adolescents and young adults willingness to receive the COVID-19 vaccine: implications for informing public health strategies. Vaccine. 2021;39(26):3473-3479.

13. De Backer C, Teunissen L, Cuykx I, et al.; Corona Cooking Survey Group. An evaluation of the COVID-19 pandemic and perceived social distancing policies in relation to planning, selecting, and preparing healthy meals: an observational study in 38 countries worldwide. Front Nutr. 2021;7:621726.

14. Hoffman KE, Garner D, Koong AC, Woodward WA. Understanding how social and organizational factors impact use of radiation therapy in a post-COVID19 world: arrangements in radiation oncology. Int J Radiat Oncol Biol Phys. 2020;108(2):370-373.

15. Yang MH, Pae JK. A study of factors affecting attitude towards teleworking: an empirical investigation of KIPO (Korean Intellectual property office) examiners' teleworking case. Korean J Commun Stud. 2009;17(2):97-123.

16. Lee J. Changes in Japanese consumer culture–from ownership to consumption of K-beauty amid the COVID-19 pandemic? J Cosmet Dermatol. 2021;39(3):505-517.

17. Kwon M. Beauty industry, ‘on-tact’ core strategy is ‘live broadcasting’. Bizwatch. 2020. http://news.bizwatch.co.kr/article/consu/2020/09/29/0026

18. Chen S, Braham S, Mackay J, Cao C, Alakbarian B. The role of smart packaging system in food supply chain. J Food Sci. 2020;85(3):517-525.

19. An R, Ji M, Zhang S. Global warming and obesity: a systematic review. Obes Rev. 2018;19(2):150-163.

20. Lee JM. Relationship between vegan cosmetics consumer's planned behavior model, brand image, and purchase intention. J Invest Cosmetol. 2021;17(3):321-331.

21. Mathieu S, Dorard G. Végétarisme, végétalisme, véganisme : aspects motivationnels et psychologiques associés à l'alimentation sélective [Vegetarianism and veganism lifestyle: motivation and psychological dimensions associated with selective diet]. Presse Med. 2016;45(9):726-733.

22. Lee J, Kwon KH. Sustainable changes in beauty market trends focused on the perspective of safety in the post-COVID-19 period. J Cosmet Dermatol. 2022. 10.1111/jocd.14493

23. Lee J, Kwon KH. Changes in the use of cosmetics by women worldwide due to increased use of masks in the coronavirus disease-19 pandemic. J Cosmet Dermatol. 2022. 10.1111/jocd.14515

24. Park E, Lee I. The effect of consumer decision type on the consumption value of vegan cosmetics. J Korean Soc Cosmetol. 2021;27(2):442-454.

25. Kim K-S, Lee I-H. The effects of the MZ generation's consumption values on determinant attributes and behavioral intention to purchase vegan cosmetics for infants and toddlers. J Korean Soc Aesthet Art. 2021;22(4):55-74.

26. Jenkins K, Kiviart J, Hamann D. Concomitant phytophotodermatitis and allergic contact dermatitis due to “natural” and “vegan” cosmetics. Dermatitis. 2020;31(1):e2-e3.

27. Waqas MK, Akhtar N, Mustafa R, Jamshaid M, Khan HM, Murtaza G. Dermatological and cosmeceutical benefits of Glycine max (soybean) and its active components. Acta Pol Pharm. 2015;72(1):3-11.

28. Chu T, Wu NL, Hsiao CY, et al. An isofoflavone extract from soybean cake suppresses 2,4-dinitrochlorobenzene-induced contact dermatitis. J Ethnopharmacol. 2020;263:113037.

29. Lai J, Xin C, Zhao Y, et al. Study of active ingredients in black soybean sprouts and their safety in cosmetic use. Molecules. 2012;17(10):11669-11679.

30. Teh SS, Mah SH. Stability evaluations of different types of vegetable oil-based emulsions. J Oleo Sci. 2018;67(11):1381-1387.

31. Park JH, Ahn EK, Ko HJ, et al. Korean red ginseng water extract alleviates atopic dermatitis-like inflammatory responses by negative regulation of mitogen-activated protein kinase signaling pathway in vivo. Biomed Pharmacother. 2019;117:109066.

32. Góral I, Wojciechowski K. Surface activity and foaming properties of saponin-rich plants extracts. Adv Colloid Interface Sci. 2020;279:102145.

33. Sharma O, Sultan AA, Ding H, Triggle CR. A review of the progress and challenges of developing a vaccine for COVID-19. Front Immunol. 2020;11:585354.

34. Šakan D, Žuljević D, Rokvić N. The role of basic psychological needs in well-being during the COVID-19 outbreak: a self-determination theory perspective. Front Public Health. 2020;8:583181.

35. Macartney K, Quinn HE, Pillsbury AJ, et al.; COVID-19 Schools Study Team. Transmission of SARS-CoV-2 in Australian educational settings: a prospective cohort study. Lancet Child Adolesc Health. 2020;4(11):807-816.

36. Panovska-Griffiths J, Kerr CC, Stuart RM, et al. Determining the optimal strategy for reopening schools, the impact of test and trace interventions, and the risk of occurrence of a second COVID-19 epidemic wave in the UK: a modelling study. Lancet Child Adolesc Health. 2020;4(11):817-827.

37. Im C, Gong Y. A study on the protection of industrial technology leakage in the untact era. Korean J Ind Secur. 2021;11(1):271-299.

38. Lee S. A study of contemporary visual culture: individualization, SNS, streaming and post-films movie. Semiot Inq. 2019;59:181-205.

39. Xu Y, Ye Y. Who watches live streaming in china? Examining viewers' behaviors, personality traits, and motivations. Front Psychol. 2020;11:1607.

40. Lee YH, Yuan CW, Woon DY. How video streamers’ mental health disclosures affect viewers’ risk perceptions. Health Commun. 2021;36(14):1931-1941.

41. Choi J. [Live commerce is on the rise] Beauty industry strengthens content targeting MZ generation. NEWSIS. 2020. https://newsis.com/view/?id=NISX20201127_0001250348

42. Lee J, Kwon KH. Mobile shopping beauty live commerce changes in COVID-19 pandemic focused on fun contents of MZ generation in Republic of Korea. J Cosmet Dermatol. 2022. 10.1111/jocd.14442

43. Huh Y. A Study on development of vegan cosmetics matching convergence service application for changes in beauty consumer market. Korean Soci Sci Art. 2021;39(3):505-517.

44. Siebert AK, Obeid R, Weder S, et al. Vitamin B-12 fortified toothpaste improves vitamin status in vegans: a 12-wk randomized placebo-controlled study. Am J Clin Nutr. 2017;105(3):618-625.

45. Lee J, Kwon KH. DTC genetic test for customized cosmetics in Republic of Korea. J Cosmet Dermatol. 2021;20(10):3085-3092.

How to cite this article: Lee J, Kwon KH. Good ingredients from foods to vegan cosmetics after COVID-19 pandemic. J Cosmet Dermatol. 2022;21:3190–3199. doi:10.1111/jocd.15028

SUPPORTING INFORMATION
Additional supporting information may be found in the online version of the article at the publisher’s website.