

Consumer acceptance of split gill mushroom (*Schizophyllum commune*) extracts as functional ingredient in topical products

[Penerimaan pengguna terhadap ekstrak cendawan kukur (*Schizophyllum commune*) sebagai bahan berfungsi dalam produk topikal]

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Keywords: split gill mushroom (*Schizophyllum commune*), whitening moisturising cream, anti-aging moisturising cream, consumer acceptance

Abstract

Mushrooms are a versatile source of food with various use and largely exploited for its's bioactive compounds that has medicinal values. Research has been conducted to unveil the potential of mushrooms to be used as new functional food, nutraceuticals, cosmeceutical and cosmetic products. There is minimal downstream processing on locally cultivated mushrooms as well as lack of variety of mushroom based products. MARDI has successfully developed topical formulations containing bioactive extracts from *Schizophyllum commune* with anti-oxidative, anti-aging and anti-hyperpigmentation properties. The objectives of this study was to assess consumer's acceptance of anti-aging and whitening topical products based on *S. commune*, as well as perceptions on mushroom-based products. A study was conducted with 213 participants from Kuala Lumpur, Selangor, Negeri Sembilan and Johor. 81.3% of respondents were consumers between the ages of 22 and 40. Findings show majority of respondents preferred whitening moisturising cream over anti-aging cream as their preferred topical product. Respondents positively rated the overall physical characteristics quality of the studied products, such as consistency and smoothening effect. It was discovered that the nutritional benefits and functional properties of the product, as well as its halal status, influenced respondents' purchasing decision of topical products. A good applicability of the product is also an important criteria, as is the content of natural materials in the products. More than half of the respondents (77.4%) indicated that they would consider replacing their current moisturising creams with these products. Generally, *S. commune* based topical products were well accepted by consumers and has a high potential in the local market. More research into developing mushroom based topical products should be initiated so that functional ingredients of products are supported by scientific evidence. Marketing strategies must also be strengthened.

Introduction

Mushrooms have long been valued for their flavour, texture and nutritional value as a food source, as well as their medicinal

and tonic properties. Mushrooms are high in protein, vitamins, minerals and they are also high in promising restorative compounds like glucan, terpenoids and

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lectins (Rathore et al. 2019). Mushrooms have numerous health benefits, including increasing vital energy, assisting in weight management, increasing longevity and lowering the risk of premature ageing (Bashir et al. 2014 and Chang et al. 2012).

Mushrooms have been used in nutraceuticals, cosmeceuticals and cosmetic functional ingredients in addition to being a source of food and medicine. Both men and women use cosmetics, also known as personal care products, to cleanse and beautify their skin (Millikan 2001). Consumer interest in and demand for natural and/or organic functional ingredients in cosmetic products has significantly increased. Natural products and ingredients are widely being used in commercial formulations because they are perceived to be healthier, more organic and safer. Many cosmetic formulations include natural ingredients that have a specific biological function, such as reducing hyperpigmentation, preventing acne and minimising wrinkle formation. Growing both consumer and manufacturer receptivity to the use of natural cosmetics was aided by rising concerns about synthetic substances and environmental and health awareness (Amberg and Fogarassy 2019). A increasing number of commercially available personal care products contain mushroom extracts or bioactive compounds.

Many mushroom compounds have strong antioxidant and anti-inflammatory properties and they are frequently used to treat facial skin issues like fine lines, wrinkles, uneven tone, and texture. According to Taofiq et al. (2016), mushroom compounds such as phenolics have multiple cosmeceutical functions such as anti-aging and anti-hyperpigmentation. According to Hyde et al. (2010) and Camassola (2013), mushrooms contain ceramides, glucans, omega fatty acids, carotenoids, resveratrol and other substances that are making their way into cosmetics. *Ganoderma lucidum* is the most common mushroom found in commercial cosmetic products. Numerous

studies on the capability of mushroom extracts or compounds as functional cosmetics ingredients (Wu et al. 2016) indicate that mushrooms should be further investigated and actively developed into effective products. A subsequent consumer study should be conducted for the developed products to investigate consumer perception and provide guidance for further product development and marketing.

Research background

Many locally produced mushrooms, such as *Pleurotus ostreatus*, *Auricularia polytricha*, *Calocybe indica*, *Tremella fuciformis*, *Volvariella volvace*, and *Schizophyllum commune*, are marketed as fresh produce, with only a few species being developed into food products such as burger patties and other value-added products. However, our local industry has a significant lack of downstream processing and a wide range of mushroom-based products. MARDI has funded extensive research into producing mushroom extracts with cosmeceutical properties, recognising mushrooms' potential as a source of functional ingredient for personal care products and the critical need for mushroom-based product diversification. Two active extracts of *S. commune* have been developed with anti-oxidative, anti-hyperpigmentation (whitening) and anti-wrinkle (anti-aging) properties. In vitro cytotoxicity and efficacy tests on skin cell lines were used to determine the safety and efficacy of these extracts. The extracts were then used as an active functional ingredient in two different types of topical skin formulations: whitening and anti-aging moisturising creams. The formulations were created without the use of harsh chemicals or chemicals derived from animals. As a result, empirical data was required to assess consumer perception of mushroom-based topical products and to investigate the marketability of developed products. The purpose of the study was to evaluate consumer acceptance and perceptions of novel anti-aging and whitening moisturising

cream products developed by MARDI that contain functional active extracts from *S. commune*. This research is expected to provide some information and insights into consumer perceptions and opinions about mushroom-based cosmetic creams as a new product in the Malaysian cosmetics market.

Literature review

People across the world use wild mushrooms for food, medicine and cosmetics, as well as for other economic and cultural purposes. More mushroom species are now being used worldwide as an ingredient in food and cosmetics. Various products containing mushrooms have entered the markets, mainly in the form of medicinal products, but quite a number of them are personal care products including cosmetics. According to Liu (2002), there are several types of mushrooms that are incorporated in topical creams, lotions, ointments, serums and facial preparations as cosmetic ingredients. Zhang et al. (2002) and Choi et al. (2014) stated that mushrooms such as Shiitake (*Lentinula edodes*), Maitake (*Grifola frondosa*), Reishi or Lingzhi (*G. lucidum*), Yartsa Gunbu (*Cordyceps sinensis*) and jelly fungi (*Tremella* spp.) are highly potential to be used and some are being used as cosmetic ingredients. These are traditionally used in Asian countries, particularly China, Japan, Thailand, Taiwan and Korea.

Many studies have been done to investigate different components in mushrooms that are beneficial to the skin. The presence of bioactive components in the mycelium, fruiting bodies and extracts of mushrooms makes it an attractive functional ingredient. Compounds such as polyphenolics, polysaccharide, terpenoids and vitamins from mushrooms are known to be beneficial for maintaining the health of human skin and hair as well as protecting and repairing damages of the skin. These compounds have exhibited potent anti-oxidative, anti-wrinkle, anti-inflammatory as well as moisturising effects. There are still plenty of other mushroom species with

significant potential for use in the cosmetic industry that are currently not known or insufficiently researched (Smith et al. 2002 and Hyde et al. 2010). Meng et al. (2011) has reported *P. citrinopileatus* as a promising source of ingredient for skin cosmetics due to its cosmeceutical potentials.

Inhibition of melanin, anti-bacterial and anti-oxidant activity were among several pharmacological benefits related to cosmetics from *Ganoderma* proteins, as reviewed by Li et al. (2019). A study by Lee et al. (2016) summarised that extracts from white jelly mushroom (*Tremella fuciformis*) protects against wrinkles cause by UVB-stimulated damage. The discovery and determination of extracts or compounds from mushrooms with desirable cosmeceutical effects and development of these biologically active ingredients into new products remain an important challenge (Kim et al. 2016). Sujarit et al. (2021) has predicted that progression in technology and knowledge will uncover more active substances from mushrooms and will help enhance cosmeceutical products. Similarly, based on the nutritional, medicinal and cosmetic value of *Agaricus bisporus*, Usman et al. (2021) summarised that the trend of using mushrooms in the cosmetic industry should increase over time. Developing effective natural cosmeceutical products with good quality sensory attributes as well as excellent packaging is crucial in order to secure consumers' acceptance. As concluded by a study by Schifferstein and Howell (2015), essential additives for personal care products such as fragrance and colour were among important attributes for consumer overall preferences, which influences purchase intent.

Methodology

Production of S. commune based creams

Two functional extracts from *S. commune* in the form of freeze-dried powder were produced through optimised extraction method in the Bio-processing Laboratory of MARDI. Two topical skin products,

namely whitening moisturising cream and anti-aging moisturising cream containing the *S. commune* extracts, were produced and packed at Grace Cosmetics Sdn. Bhd. (a GMP-certified facility) in Johor. The topical products were prepared according to accepted hygiene and manufacturing practises.

Data collection

This cross-sectional study involving a total of 213 (n = 213) adult respondents which are in various age, gender, ethnic, and education level in order to reflect the actual Malaysian population (*Table 1*). By using the non-probability purposive sampling technique, the respondents were limited to those who knew of or have used or are using anti-aging and/or whitening moisturiser. A minimum number of 100 respondents was considered as suggested by Hair et al. (2010). In this study, a set of questionnaires was prepared and the questionnaire was divided into four parts, namely the respondents' feedback based on sensory evaluation of the given sample of products, respondents acceptance of the studied products, the respondents perception of topical products and the respondents' profiles. Each respondent was given a set survey package containing paper questionnaire, products information sheet and two *S. commune*-based topical products (anti-aging and whitening moisturising cream) as a tester sample. Each respondent was requested to smell each sample for its aroma and apply each cream to their skin to evaluate the products' other physical characteristics which were adhesiveness, spreadibility, smoothing effect and consistency, according to their personal preferences. A 9-point Likert scale was used in the study that represents quality of the physical characteristics from very poor to excellent, likeness degree of the studied products and rate of importance of factors influencing purchasing decisions of respondents. The respondents were then invited to fill out the questionnaire.

Table 1. Respondent distribution

| Area | Number of respondents |
|-----------------|-----------------------|
| Kuala Lumpur | 63 |
| Selangor | 100 |
| Negeri Sembilan | 30 |
| Johor | 20 |

Univariate descriptive analysis was performed by using the Statistical Package for Social Science (SPSS).

Results and discussion

Profile of respondents

Table 2 shows a demographic breakdown of all 213 respondents in this study. A total of 79.1% of respondents are female, with 54.11% being single. 46.6% of respondents were between the ages of 21 and 30 and 34.67% were between the ages of 31 and 40, with 72.7% having graduated from university. 31.4% are employed in the private sector, while 37.6% are employed in the public sector. A total of 55.4% of respondents reported a monthly household income of between RM1,501 and RM3,000, while 41.1% reported a monthly household income of between RM3,001 and RM6,000.

Based on *Table 3*, respondents spent less than RM75 per month on whitening products (52%), anti-aging products (51.3%), and other topical products (64%). A few respondents reported spending more than RM300 on their preferred topical products.

Respondent feedback on the physical characteristics of *S. commune*-based topical products

Topical products such as moisturising creams are meant to be applied on the skin; therefore, consumer acceptance of topical products is highly based on these products' physical characteristics. Sensory analysis of a product, according to Soto et al. (2018), indicates how it is perceived and influences consumer acceptance. *Table 4* displays the responses of respondents to

Table 2. Respondent profile

| Items | Category | Frequency | Percentages |
|-------------------|---------------------|-----------|-------------|
| Gender | Male | 42 | 19.63 |
| | Female | 171 | 79.91 |
| Ethnic | Malay | 190 | 82.25 |
| | Chinese | 11 | 4.76 |
| | Indian | 14 | 6.06 |
| | Sabah and Sarawak | 16 | 6.93 |
| Marital status | Single | 125 | 54.11 |
| | Married | 97 | 41.99 |
| | Divorced or widowed | 9 | 3.90 |
| Age | <21 | 14 | 6.22 |
| | 22 – 30 | 105 | 46.67 |
| | 31 – 40 | 78 | 34.67 |
| | 41 – 50 | 20 | 8.89 |
| | 51 – 60 | 5 | 2.22 |
| | >60 | 3 | 1.33 |
| Education level | University graduate | 168 | 72.73 |
| | Secondary school | 61 | 26.41 |
| | Primary school | 1 | 0.43 |
| | Informal education | 1 | 0.43 |
| Employment | Public sector | 86 | 37.55 |
| | Private sector | 72 | 31.44 |
| | Self-employment | 19 | 8.30 |
| | Others | 50 | 21.83 |
| Individual income | <RM1,500 | 39 | 21.20 |
| | RM1,501 – RM3,000 | 102 | 55.43 |
| | RM3,001 – RM4500 | 19 | 10.33 |
| | RM4,501 – RM6,000 | 17 | 9.24 |
| | >RM6,000 | 7 | 3.80 |
| Household income | <RM3,000 | 56 | 37.09 |
| | RM3,001 – RM6,000 | 62 | 41.06 |
| | RM6,001 – RM8,000 | 18 | 11.92 |
| | RM8,001 – RM10,000 | 8 | 5.30 |
| | >RM10,000 | 7 | 4.64 |

the physical characteristics of MARDI's *S. commune*-based anti-aging and whitening moisturising creams. According to the mean values, respondents preferred the physical characteristics of the whitening moisturising cream over the anti-aging moisturising cream. The smoothing effect, adhesiveness, and spreadability of the whitening moisturising cream were the most well-liked features.

Figures 1 – 5 show specific feedback for each of the studied topical products' characteristics. Majority of respondents were pleased with the physical properties of the moisturising creams. According to *Figure 1*, 37.7% of respondents thought the whitening moisturising cream had a very good aroma, while 2.2% thought it was very poorly scented. A similar pattern was seen with anti-aging moisturising cream.

Table 3. Respondents monthly expenditures on cosmetic products

| Item | Category | Whitening products | Anti-aging products | Other products |
|----------|---------------|--------------------|---------------------|----------------|
| | | % | % | % |
| Expenses | <RM75 | 52.0 | 51.3 | 64.0 |
| | RM75 – RM150 | 31.0 | 31.3 | 30.9 |
| | RM150 – RM225 | 9.0 | 11.3 | 2.9 |
| | RM225 – RM300 | 5.0 | 3.8 | 1.4 |
| | >RM300 | 3.0 | 2.5 | 0.7 |

Table 4. Score of physical characteristics of topical products based on Likert scale

| Characteristics | Product types | Mean | Std. deviation |
|-----------------|---------------|------|----------------|
| Aroma | Whitening | 6.58 | 1.900 |
| | Anti-aging | 6.40 | 1.937 |
| Adhesiveness | Whitening | 7.29 | 1.643 |
| | Anti-aging | 6.85 | 1.832 |
| Spreadibility | Whitening | 7.27 | 1.568 |
| | Anti-aging | 7.10 | 1.692 |
| Smoothing | Whitening | 7.36 | 1.517 |
| | Anti-aging | 7.19 | 1.535 |
| Consistency | Whitening | 7.07 | 1.563 |
| | Anti-aging | 6.93 | 1.669 |

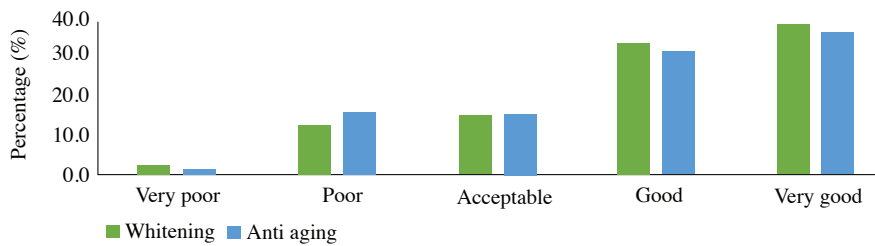


Figure 1. Respondents feedback on products' aroma

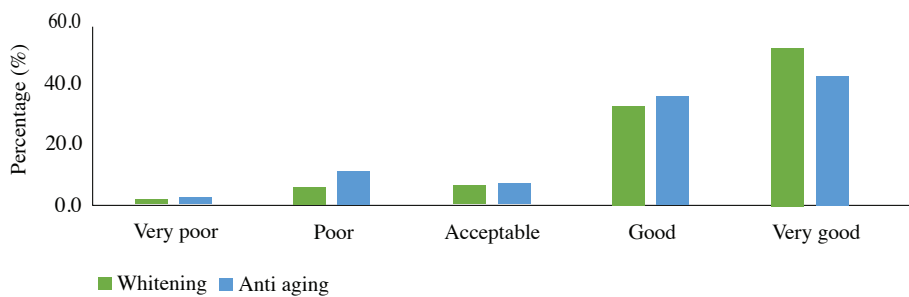


Figure 2. Respondents feedback on products' stickiness

Figure 2 shows that majority of respondents reacted positively to the adhesiveness of the products under consideration. The good stickiness quality of whitening moisturising cream was acknowledged by 52.4% of respondents.

As illustrated in Figure 3, majority of respondents thought that both moisturising creams had good consistency quality. The whitening moisturising creams were rated as having very good consistency by 42.4% of respondents, and the anti-aging moisturising cream was rated similarly by 43.2%. Respondents' negative feedback for whitening and anti-aging moisturising cream was less than 5% and 10%, respectively.

In terms of the spreadability quality of the products studied, whitening moisturising cream was deemed to be of higher quality than anti-aging cream. As shown in Figure 4, 52.2% of respondents thought the whitening cream was very spreadable.

Following the same pattern as the results for aroma, stickiness, and spreadability, whitening moisturising cream was deemed to have superior smoothing effect quality when compared to anti-aging cream. As shown in Figure 5, 54.5% of respondents thought whitening cream had a very good smoothing effect. For both creams, negative feedback for this attribute was less than 10%.

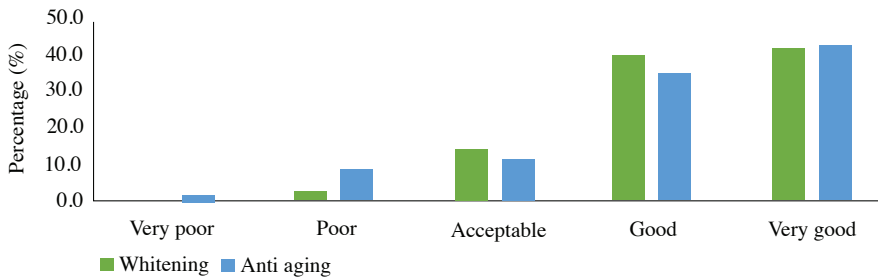


Figure 3. Respondents feedback on products' consistency

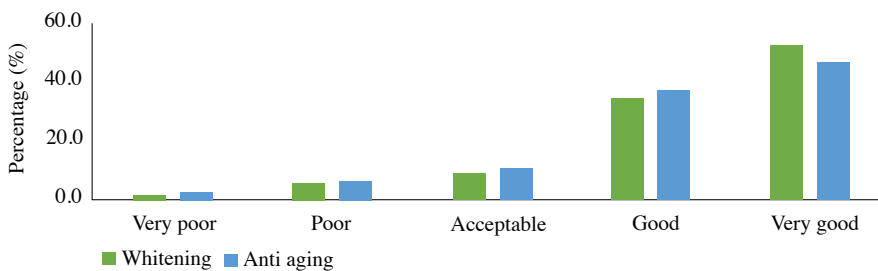


Figure 4. Respondents feedback on products' spreadability

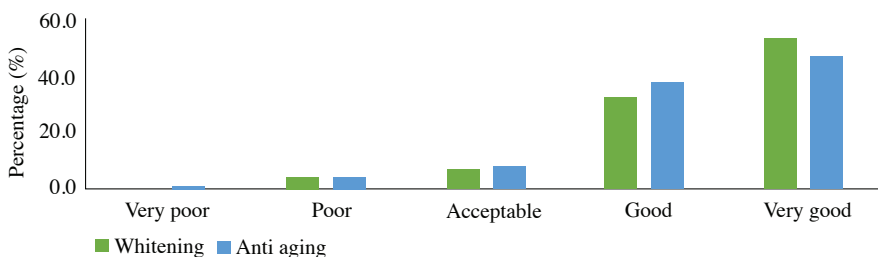


Figure 5. Respondents feedback on the products' smoothing effect

The overall findings revealed that respondents thought the physical properties of *S. commune*-based topical products were very good. Sensory attributes such as appearance, odour and texture are used to assess the quality of topical products. According to Elezoviü et al. (2017), product packaging has the greatest influence on consumer acceptance of new cosmetic products, followed by the touch and feel of the products. As a result, desirable sensory characteristics of cosmetic products may increase the likelihood of a product being successfully marketed and well-received by consumers.

Respondents opinion towards *S. commune*-based topical products

Along with the product samples, respondents were given specific information about the products during this study to help them better understand the function and beneficial effects of the moisturising creams. The respondents were also informed that the moisturising creams under consideration were free of harsh chemicals such as parabens and sulphates, were free of animal-derived materials, and contained active

ingredients derived from natural resources. *S. commune* benefits for human skin were unknown to 54.8% of respondents (data not shown). The open-ended question was used to assess respondents attitudes toward the studied products. According to the findings in Table 5, the scent and non-stickiness of both whitening and anti-aging moisturising creams received generally positive feedback. Surprisingly, the scent of these products was also the most common reason for respondents’ disapproval of the products under consideration.

Based on the descriptive information provided and sensory evaluation of the physical characteristics of the studied products, 77.4% of respondents were willing to replace their current moisturising creams with the studied products, while 52 (22.6%) were not (Table 6). This observation can be

Table 6. Respondents willingness to switch their current products to the studied products

| Category | N | % |
|--------------------------------------|-----|------|
| Agree to switch to studied products? | | |
| Yes | 165 | 77.4 |
| No | 48 | 22.6 |

Table 5. Respondents opinion towards *S. commune* based topical products

| Whitening moisturising cream | | | |
|--------------------------------------|--------------------|-------------------|--------------------|
| Like | No. of respondents | Dislike | No. of respondents |
| Nice scent | 66 | Unpleasant scent | 35 |
| Easily absorbed | 44 | Harsh and sticky | 8 |
| Non sticky | 52 | | |
| Easy to spread | 6 | | |
| Smooth, moist and soft | 25 | | |
| Non greasy | 3 | | |
| Anti-aging moisturising cream | | | |
| Like | No. of respondents | Dislike | No. of respondents |
| Nice scent | 45 | Unpleasant scent | 32 |
| Easily absorbed | 33 | Harsh | 4 |
| Non sticky | 42 | Not absorbed well | 17 |
| Moist and soft | 22 | | |
| Easy to spread | 2 | | |

attributed to the respondents' feedback on the physical characteristics of the products, specifically their spreadibility and smoothing effects. The primary hypothesis of this study was that consumers would accept topical mushroom products. This hypothesis is supported by our findings. *Figure 6* shows that more than 60% of respondents were willing to pay less than RM50 for the whitening S. commune-based moisturising cream. Given majority of respondents' monthly cosmetic product expenses and household income, it is reasonable to assume that they were unwilling to spend more than RM120. These are important factors in determining a product's target consumer group and affordability.

Interestingly, while respondents preferred the physical properties of the whitening cream over the anti-aging counterpart, 54.9% were willing to pay more than RM50 for anti-aging moisturising cream, with a price range of RM51 to RM120. It is worth noting that respondents were informed of a significant difference in ingredients between the two products under consideration. One significant difference was the presence of hyaluronic acid in the anti-aging moisturising cream versus jojoba oil in the whitening cream. Hyaluronic acid is a popular and in-demand ingredient in both cosmetology and aesthetic medicine (Juncan et al. 2021). As a result, it is possible that the presence of hyaluronic

acid in anti-aging moisturising cream contributed to respondents' willingness to pay more for the anti-aging cream than the whitening cream. This is consistent with the findings of a study by Danner et al. (2017), which concluded that product descriptions influence expectations, liking, and willingness to pay for a product. Product information can elicit positive reactions, which are influenced by each respondent's assessment and increase product acceptance scores (Lysák et al. 2019).

Respondents perception of mushroom-based products

Consumers in Malaysia are generally unfamiliar with the use of mushrooms as functional ingredients in topical cosmetic products. Malaysians generally regard mushrooms as a fresh produce that can be consumed directly (Mat Amin et al. 2017). The respondents' level of knowledge about the use of mushrooms in value-added products was assessed. According to the findings in *Figure 7*, the use of mushrooms as health-related products was the most widely recognised by respondents (72.89%). According to a recent study by Bringye et al. (2021), health-conscious consumers are well informed about the medicinal and functional properties of mushrooms, and majority of consumers view mushrooms as a supplementary food source. It is important to note, however, that consumer behaviour

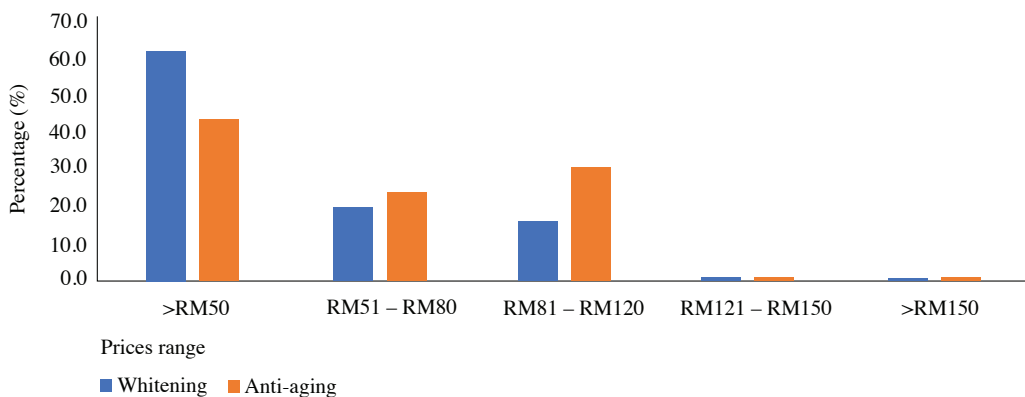


Figure 6. Respondents' willingness to pay

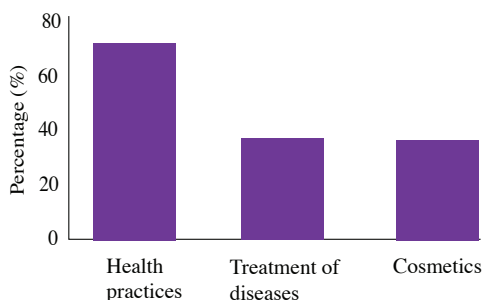


Figure 7. Respondents' perspective on the benefits of mushroom-based products

and knowledge differ depending on gender and other socio-demographic factors.

Most cosmetics companies use multilevel distribution strategies, such as placing products in department stores, pharmacies, and websites, but direct-reaching methods, such as the use of direct-selling agents, have also been used. In this study, five marketing channels were listed in

the questionnaire to gather information on respondents' purchasing habits, specifically for moisturising cream products. Figure 8 shows that 52% of respondents bought their moisturising creams from a product agent, while 45.2% bought them from a supermarket, and 42.6% bought them online. Many local topical product entrepreneurs, particularly those selling cosmetic or cosmeceutical products such as moisturising creams, now prefer individual agents as the primary distributors and sellers of their products.

Because of the rapid development of the internet and smartphones, information can now be obtained in a variety of ways. According to Figure 9, 70.6% of respondents got information about moisturising cream products from the internet, such as search engines like Google and social media platforms like Facebook or Instagram. This may be attributed to the

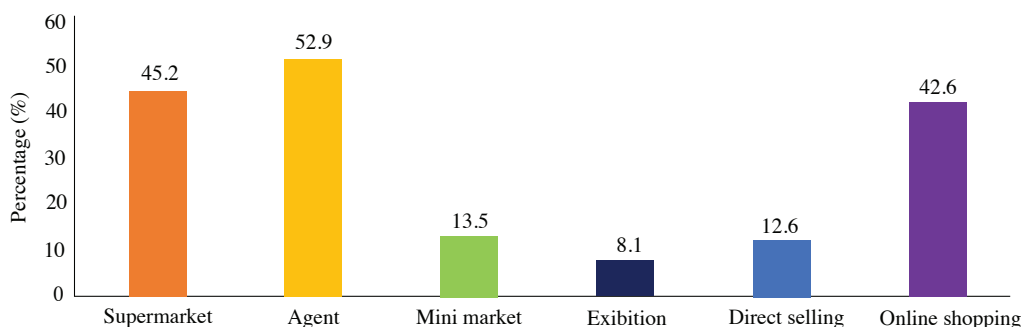


Figure 8. Respondents' preference on products marketing channel

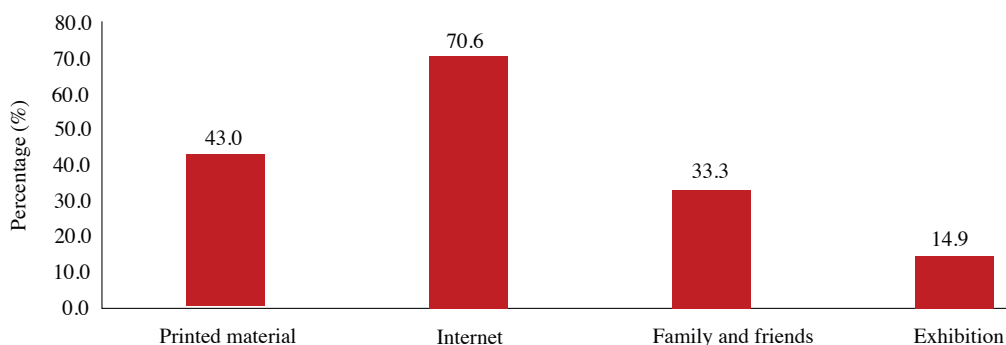


Figure 9. Sources of reference for topical products among respondents

ease and speed with which content from internet sources can be accessed, as well as the attractiveness of content from internet sources in comparison to other sources of information. Printed materials such as magazines, brochures, and newspapers were also popular ways for respondents to obtain product information.

Table 7 shows the factors that influenced topical product purchasing decisions. It was discovered that nutritional content and functional properties of products were two of the most important factors influencing respondents' purchasing decisions for topical products. Many cosmetic products on the market highlight scientific evidence for their efficacy; however, overstatements may cause consumers to become confused and distrustful. One of the major concerns among consumers, as described by Nordin et al. (2020) in their systematic review, is a lack of scientific evidence on the safety and risks of cosmetic ingredients. The halal status of the products was also considered. Our findings are consistent with the fundamental consumer demands for cosmetic products, which are quality,

efficiency and safety (Fonseca-Santos et al. 2015). Similarities were discovered in a study conducted by Abdul Rani and Krishnan (2018), in which halal status was one of the main factors influencing cosmetic product purchasing decisions. Spreadability, or the ability of cream to spread on the skin, was also identified as an important factor by respondents. Spreadability is an important factor in the administration of topical products, affecting their effectiveness (Djiobie Tchienou et al. 2018).

Another factor considered important by respondents was the content of natural materials. According to Amberg and Fogarassy (2019), the use and search for natural materials and additives in cosmetic products is on the rise. Our findings are consistent with those of Ayob et al. (2016), who describe Malaysian consumers' positive perceptions of natural cosmetic products. As a result, it is possible that the functional ingredient from *S. commune* found in the moisturising creams was one of the factors influencing the respondents' acceptance of the studied products. Mati and Puh (2016) concluded that health-related benefits of cosmetics should be the primary focus of

Table 7. Factors influencing the purchase of moisturising cream products

| Descriptions | Mean | Std. deviation |
|----------------------------------|------|----------------|
| Nutritional content | 8.90 | 1.042 |
| Functional properties to skin | 8.57 | 0.756 |
| Halal status | 8.55 | 1.003 |
| Product spreadability | 8.36 | 1.877 |
| Material from natural sources | 8.34 | 1.033 |
| Ease of storage | 8.28 | 1.099 |
| Price | 8.24 | 1.176 |
| Aroma | 8.00 | 1.327 |
| Product as alternative treatment | 7.95 | 1.336 |
| Local product | 7.75 | 1.727 |
| Packaging | 7.61 | 1.523 |
| Popularity of product | 7.60 | 1.630 |
| Brand | 7.59 | 1.552 |
| Promotion | 7.44 | 1.705 |
| Product design | 7.40 | 1.656 |
| Trials on new product | 7.22 | 1.717 |

cosmetic companies due to rising consumer awareness and interest. Our findings support the current trend of consumer and producer interest in and demand for natural cosmetics. According to Wansink et al. (2005), evocative product information may improve participant approval of a product.

Conclusion and recommendations

The findings of this study indicate that respondents favour *S. commune*-based whitening and anti-aging moisturising creams. Mushroom extracts as natural active ingredients in product formulations, as well as their sensory qualities, could be attributed to the respondent positive feedback. It may be necessary to highlight scientific evidence on the efficacy of the products in order to attract larger consumer groups. This may also lead to a willingness to pay more for the products under consideration. The findings of this study could help mushroom and cosmeceutical entrepreneurs choose the best products, price ranges, promotions and marketing strategies for targeted potential customers. It should be noted that this study has a limitation in terms of questionnaire distribution, with majority of respondents coming from four states in Peninsular Malaysia. Based on respondent acceptance, more research into developing similar types of products for other types of mushrooms should be conducted in order to add more value to the locally-cultivated mushroom and diversify the field of mushroom-based products in Malaysia.

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Abstrak

Cendawan merupakan sumber makanan yang mempunyai pelbagai kegunaan sama ada untuk pemakanan atau kandungan bioaktif yang terkandung didalamnya yang sesuai digunakan dalam bidang perubatan. Pelbagai kajian dijalankan dengan mengeksploitasi cendawan sebagai makanan fungsian baru, nutraseutikal, kosmaseutikal dan produk kosmetik. Namun kekurangan aktiviti pemprosesan produk hiliran daripada cendawan yang banyak ditanam menyebabkan kekurangan kepelbagaian produk di pasaran Malaysia. MARDI telah berjaya membangunkan formulasi topikal yang mengandungi bioaktif ekstrak daripada *Schizophyllum commune*. Objektif kajian ini adalah untuk menilai penerimaan dan persepsi pengguna terhadap produk daripada ekstrak cendawan *Schizophyllum commune* yang mengandungi ciri-ciri antioksidan, antipenuaan dan anti hiperpigmentasi. Satu kajian secara empirikal telah dijalankan di sekitar Kuala Lumpur, Selangor, Negeri Sembilan dan Johor melibatkan 213 responden. Sebanyak 81.3% daripada responden adalah pengguna berumur 22 – 40 tahun. Keputusan kajian menunjukkan majoriti daripada responden mengutamakan krim pelemba pemutihan berbanding dengan krim antipenuaan. Responden menilai ciri-ciri fizikal produk seperti konsistensi dan kesan melicinkan. Kajian juga mendapati bahawa kelebihan nutrisi dan sifat fungsian produk tersebut serta status halal produk mempengaruhi keputusan pembelian produk topikal. Selain dari kandungan penggunaan bahan semula jadi yang terdapat dalam produk, kriteria kebolegunaan yang menyenangkan daripada produk juga penting kepada pengguna. Majoriti responden (77.4%) menunjukkan akan mempertimbangkan untuk menggantikan penggunaan krim pelembap sedia ada kepada krim pelembap produk ini. Pembangunan produk topikal berasaskan cendawan *Schizophyllum commune* diterima baik oleh pengguna dan mempunyai potensi yang tinggi dalam pasaran. Kesimpulannya, kajian pembangunan produk berasaskan cendawan topikal boleh diteruskan agar penggunaan bahan fungsian semula jadi sesuatu produk disokong dengan bukti saintifik. Strategi pemasaran juga perlu dipergiatkan.