Razi International Medical Journal
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Journal homepage: www.rimj.org/pubs/index.php/journal

RESEARCH ARTICLE

# Assessment of knowledge, attitudes, and practices concerning skincare agents among the inhabitants in Anuradhapura District, North Central Province, Sri Lanka

**Mayuri Napagoda**[✉1], **Tharindu Panapitiya**[1]

[1] Department of Biochemistry, Faculty of Medicine, University of Ruhuna, Galle, 80000, Sri Lanka

ARTICLE INFO

**Open Access**

*Received:*
2023-09-09
*Accepted:*
2025-12-05
*Published:*
2025-12-31

*Keywords:*
Anuradhapura district
Herbal preparations
Skincare agents
Sri Lanka

ABSTRACT

**Background:** Skincare formulations have turned out to be one of the most frequently used products in the day-to-day life of people in this modern society. The present study sought the knowledge, attitudes, and practices on the usage of skincare products among the inhabitants in Anuradhapura district, North Central Province, Sri Lanka.

**Method:** A pre-validated questionnaire was used in this community-based descriptive cross-sectional study to collect information from randomly selected 404 participants. The data were analyzed by SPSS statistical package (version 20). Chi-squared test was used to determine the statistical association between the socio-demographic data and the usage of skincare products.

**Results:** Among the study population, 221 (54.7%) were identified as regular skincare product users. A statistically significant association was observed between some of the demographic data; ie. gender (p=<0.001), age groups (p=<0.001), marital status (p=0.013), and level of education (p=<0.001) with the usage of skincare products. Interestingly, 79.64% of the respondents who used skincare products preferred herbal formulations. The consumer awareness of the products they use was quite satisfactory as 95.09%, 69.23, and 77.37% of the regular users were cautious about manufacturing/expiry date, ingredients/composition, and possible side effects respectively. Moreover, 88.59% of the skincare product users had the habit of reading the safety precautions/warnings on the label. The quality of the products was the primary criterion for the purchasing of a particular product.

**Conclusion:** This study revealed that consumers in Anuradhapura district were quite rational and were aware during the selection of skincare products. Also, it pointed out the consumer preferences for herbal-based skincare formulations over synthetic counterparts.



## Introduction

Skincare is one of the important aspects of personal hygiene and well-being. A wide range of products including sunscreens, cleansers, moisturizers, antiacne, and antiaging creams are available to protect the skin from numerous harmful factors such as solar radiation, humidity, pollutants, invading microorganisms, etc. These formulations contain either synthetic or natural compounds with the ability

✉ Corresponding Author: Mayuri Napagoda
Email address: mayurinapagoda@yahoo.com

Cite this article as Assessment of knowledge, attitudes, and practices concerning skincare agents among the inhabitants in Anuradhapura District, North Central Province, Sri Lanka. *Razi International Medical Journal, 5(1).* DOI: 10.56101/rimj.v5i1.123

to enhance skin regeneration and smoothness and also to reduce the degradation of primary structural constituents of the skin (1).

The skincare practices among people show great diversity based on geographical regions, cultural practices, environmental factors, socioeconomic factors, industrial developments as well as marketing activities of cosmeceutical companies. Moreover, the chronological age of the individuals is also an important determinant as skincare agents designed for the pediatric population differ from those used by the adolescent, adult, and elderly populations (2). On the other hand, factors like accessibility, affordability, and potential adverse effects might hinder the usage of skincare agents among a large number of individuals. A study conducted in Thailand revealed that gender and education level significantly influenced the knowledge and practice of skin care among adolescents (3) while Agarwal et al. (2018) observed that the awareness about sunscreen was low among the subset of the Indian population (4). Another study conducted in India indicated that moisturizers were highly popular among all age groups, income levels, and marital status of their study population (5). Moreover, Alsharif et al. (2022) disclosed that the use of skincare agents among the Saudi population was significantly associated with the female gender and oily skin type (6). In the Sri Lankan context, a study conducted in Galle district, Sri Lanka revealed the wide acceptability of skincare products by the females in the study area, nevertheless, most of the users were not aware of the chemical composition, pH, SPF, and the possible adverse effects of the synthetic skincare products. Interestingly, the aforementioned study indicated the popularity and wide acceptance of herbal formulations as skincare agents (7).

Being in a country that lies within the equatorial belt, Sri Lankans are chronically exposed to sunlight. The equatorial locations in the world tend to be warm and as a result the people living in such areas typically wear less clothing while doing outdoor activities. Therefore, people are more likely to get exposed to high doses of UV radiation in the solar spectrum which ultimately could lead to cancers, the onset of wrinkles, photo-aging, etc. (8). Thus, the usage of skincare agents is important not only to maintain beauty but also in terms of health perspectives. In continuation of our island-wide survey aimed at assessing the knowledge, awareness, and practices regarding skincare agents among the inhabitants in different administrative areas in Sri Lanka, the present study was conducted in Anuradhapura District in the North Central Province of Sri Lanka. Valuable medicinal plants that have been used as natural skincare agents for centuries are found in high abundance in this study area where many agricultural communities also reside.

## Materials and Methods

### *Study area*

Anuradhapura is the largest administrative district in Sri Lanka and is located in the North Central Province of the country. The total area of 7179 km2 is further divided into 22 smaller administrative regions known as divisional secretariats divisions and the population is 917748 (9). The weather in the area is hot and humid all year round. June and July are considered the driest period of the year and in recent years less than 15 mm of monthly rainfall was recorded for the above two months. The high solar radiation received by the study area makes the people extremely vulnerable to dermatological conditions caused by excessive exposure to solar radiation, thus it is possible to hypothesize that skincare agents are widely popular in this community.

### *Data collection and analysis*

Information was collected from residents of all twenty-two divisional secretariats divisions in Anuradhapura district. This survey was carried out from October 2019 to October 2020 and the data were collected using an interviewer-administered questionnaire. The questionnaire was pre-validated and available in English and Sinhala languages. The questionnaire covered three main aspects; socio-demographic, practices of skincare products usage, and awareness and attitudes toward the usage of skincare products (Annex-1). The sample size was calculated as 383 according to the equation given below

$$n = \frac{z^2 \times p(1-p)}{d^2}$$

where;

n = sample size

Z = is standard normal variant at 5% type 1 error it is 1.96

P = expected proportion in population based on previous studies or pilot studies

d = absolute error or precision

A convenience sampling method was used to recruit 404 participants from the district and informed consent was obtained in writing before the study. The number of participants to be taken from each divisional secretariat was decided according to the proportion of the population stated in the Handbook of the Department of Census and Statistics. The data were collected by arranging home visits to randomly selected households in villages in each divisional secretariat area as well as from people who had assembled at public places. During the home visits, the data were gathered from a maximum of two adults per household. The people who had been living in Anuradhapura district for the past five years, above 18 years of age, capable of understanding Sinhala or English languages, and expressed their willingness to participate in this study were recruited voluntarily.

The ethical approval was obtained from the ethical review committee, Faculty of Allied Health Sciences, University of Ruhuna, Sri Lanka (permit issued on 05/08/2019). Data were analyzed by SPSS statistical package version 25.0 using descriptive statistics. A chi-square test was employed to determine the association between the socio-demographic data and the usage of skin care agents.

## Results

Four hundred and four participants comprising 187 (47.3%) males and 217 (53.7%) females were interviewed. In this sample population, the majority (32.7%) were aged 18-25 years and more than half of them (65.1%) were married. Over ninety-nine percent of the respondents had some form of education. Among all participants, 6.9% had at least a primary school education, and many (92.9%) had a good education level (up to ordinary level examination at Grade 10 and/or above). Table 1 demonstrates the demographic characteristics of the inhabitants in Anuradhapura district who participated in this study.

Table 1. Socio-demographic characteristics of study participants (n=404)

| Variable | Frequency (%) |
|---|---|
| ***Gender*** | |
| Male | 187 (46.3) |
| Female | 217 (53.7) |
| ***Age group*** | |
| 18-25 years | 132 (32.7) |
| 26-35 years | 97 (24.0) |
| 36-45 years | 84 (20.8) |
| 46-55 years | 39 (9.7) |
| 56-65 years | 32 (7.9) |
| Above 65 years | 20 (5.0) |
| ***Level of education*** | |
| Not schooling | 1 (0.2) |
| Primary education | 28 (6.9) |
| Up to ordinary level examination | 162 (40.1) |
| Up to the university entrance examination | 173 (42.8) |
| Higher education | 40 (9.9) |
| ***Marital status*** | |
| Married | 263 (65.1) |
| Unmarried | 141 (34.9) |
| ***Employing or not*** | |
| Yes | 177 (43.8) |
| No | 227 (56.2) |

Considering the total responders of 404 participants, 221 (54.7%) mentioned the use of skincare products. Therefore, information on the product type, intended usage, awareness of various product parameters, source of information etc. were collected from these 221 participants and analysed further.

The chi-square test was used to assess the association between demographic data and skincare product usage among the participants of the study. Table 2 shows the association between socio-demographic data and skincare product usage among the participants.

There was a statistically significant association between some of the demographic data. Gender is significantly associated with the usage of skincare products (p= <0.001). Also, age groups (p=<0.001), marital status (p=0.013), and level of education (p=<0.001) had statistically significant association with the usage of skincare products. However, there was no statistically significant association between employment status and the usage of those products.

Table 2. Association between socio-demographic data and the usage of skincare products

| Variable | Usage of skincare product | | $x^2$ | *p*-value |
|---|---|---|---|---|
| | Frequency | Percentage (%) | | |
| **Gender** | | | | |
| Male | 73 | 33.0 | 34.480[a] | <0.001 |
| Female | 148 | 67.0 | | |
| **Age groups** | | | | |
| 18-25 years | 88 | 39.8 | 54.878[a] | <0.001 |
| 26-35 years | 64 | 29.0 | | |
| 36-45 years | 47 | 21.3 | | |
| 46-55 years | 15 | 6.8 | | |
| 56-65 years | 7 | 3.2 | | |
| Above 65 | 0 | 0.0 | | |
| **Marital status** | | | | |
| Married | 132 | 59.7 | 6.194[a] | 0.013 |
| Unmarried | 89 | 40.3 | | |
| **Level of Education** | | | | |
| Not schooling | 0 | 0.0 | 38.295[a] | <0.001 |
| Primary education | 2 | 0.9 | | |
| Up to ordinary level examination | 80 | 36.2 | | |
| Up to the university entrance examination | 112 | 50.7 | | |
| Higher education | 27 | 12.2 | | |
| **Employment status** | | | | |
| Employing | 101 | 45.7 | 0.708[a] | 0.400 |
| Not employing | 120 | 54.3 | | |

The skincare products mentioned by the respondents included fairness creams, moisturizer creams, shaving creams, sunscreens, anti-aging creams, anti-wrinkle creams, lip balms, and anti-acne creams. The most frequently reported skincare product category was moisturizer creams (62.90%) while 33.03% had used sunscreens. According to the age groups, there was a significant usage of moisturizer creams among the age groups of 18-25 and 26-35 years. Other mostly used skincare products were sunscreens and fairness creams (Figure 1). The majority had used these skincare products for 1-5 years (50.23%) while 20.81% had practiced it for 6-10 years. Interestingly, 16.74%. mentioned that they had over 10 years of experience in using skincare products while only 12.22% had recently (< 1 year) started using these products.

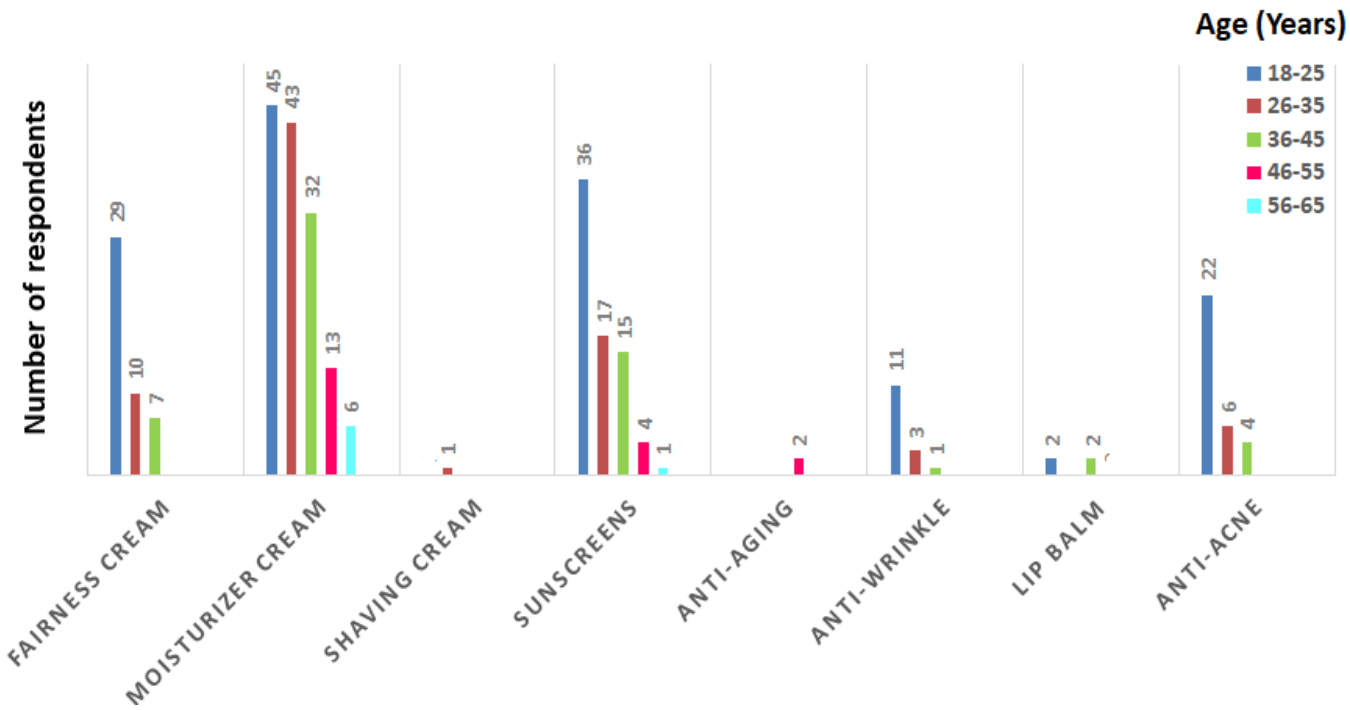


Figure 1. Usage of skincare products according to types and age groups

Among the users, over three-quarters (79.64%) preferred herbal skincare products including home-made preparations while 4.07% of the respondents preferred chemical-based (synthetic) products. Moreover, 16.29% mentioned the concurrent use of herbal and synthetic formulations. In addition to the commercially available herbal skincare products, home-made herbal formulations were also popular among the consumers as 19.46% stated the in-house preparation of formulations with the use of different parts of plants (Table 3). Most of these home-made preparations contained Aloe vera (76.74%). The above observations indicate that nowadays most consumers prefer natural cosmeceutical products over synthetic agents.

Table 3. Plant species used for the preparation of home-made herbal skincare formulations

| Plant Species | Family | Plant part | Mode of preparation | Purpose |
|---|---|---|---|---|
| *Santalum album* | Santalaceae | Bark | Powdered and mixed with turmeric and neem: topical application<br>Bark is ground to make a paste: topical application | As a sunscreen, moisturizer<br>For acne |
| *Kokoona zeylanica* | Celastraceae | Bark | Mixed with white sandalwood and turmeric: topical application | Enhance fairness, to treat oily skin |
| *Citrus aurantifolia* | Rutaceae | Fruit | Juice is mixed with *Aloe vera* leaves, lime juice, turmeric, coconut oil: topical application | To prevent skin dryness, for acne |
| *Azadirachta indica* | Meliaceae | Leaves | Ground with *Aloe vera*: topical application<br>Ground with *Aloe vera* and turmeric: topical application | For acne<br>Moisturizer, for acne |
| *Crocus sativus* | Iridaceae | Stigma | Ground with *Aloe vera:* topical application | Enhance fairness |
| *Aloe vera* | Xanthorrhoeaceae | Leaves | Extracted the gel/sap: topical application<br>Make a paste with bee honey and coconut water | To prevent skin dryness, prevent wrinkles, enhance fairness of the skin, remove black spots, for acne, to clean the skin<br>As a moisturizer |
| *Persea americana* | Lauraceae | Fruit | Prepared a paste with papaya and lime juice: topical application | As a skin nourishment |
| *Cicer arietinum* | Fabaceae | Seeds | Ground with *Aloe vera* juice: topical application | Enhance fairness |
| *Carica papaya* | Caricaceae | Fruit | Cut into slices and placed on the eyes | As a moisturizer |
| *Cocos nucifera* | Arecaceae | Milk | Make a paste with *Aloe vera*: topical application | As a moisturizer |

Table 3. Plant species used for the preparation of home-made herbal skincare formulations *(continued)*

| Plant Species | Family | Plant part | Mode of preparation | Purpose |
|---|---|---|---|---|
| *Coscinium fenestratum* | Menispermaceae | Stem | Powdered and mixed with turmeric and white sandalwood: topical application | Enhance fairness |
| *Curcuma aromatica* | Zingiberaceae | Rhizome | Ground with lime juice and water: topical application powdered with white sandalwood and mixing and making a cream | Enhance fairness |
| *Curcuma longa* | Zingiberaceae | Rhizome | Prepared a paste: topical application<br>Prepared a paste with white sandalwood<br>Ground and mixed with *Aloe vera* : topical application | For acne<br>As a moisturizer, sunscreen<br>Enhance fairness, sunscreen |
| *Punica granatum* | Lythraceae | Leaves | Ground with yoghurt and ghee | Enhance fairness |

The consumer awareness regarding the usage of skincare agents among the study population was quite satisfactory as shown in Figure 2. Over 95% of the consumers were cautious about the manufacturing/expiry date (95.09%) and aware of the ingredients/composition of the product (69.23%) they were using. Moreover, 88.59% of the skincare product users had the habit of reading the safety precautions/warnings on the label while 77.37% were aware of the possible side effects associated with these products. For the majority of the respondents (79.64%), the quality of the product was the main consideration in choosing a particular product. Other aspects that influenced the selection were brand name (15.83%) and price (3.62%) along with non-specified factors (0.94%). Consumer buying behavior was considerably influenced by television advertisements and other media (41.18%), friends (34.84%), promotion programs (13.12%), and posters (10.86%). The majority of the respondents (77.36%) made the final decision about the skincare products by themselves while 22.62% sought some opinions or instructions from someone else. Pharmacists were the most common source of information regarding skincare products (40%).

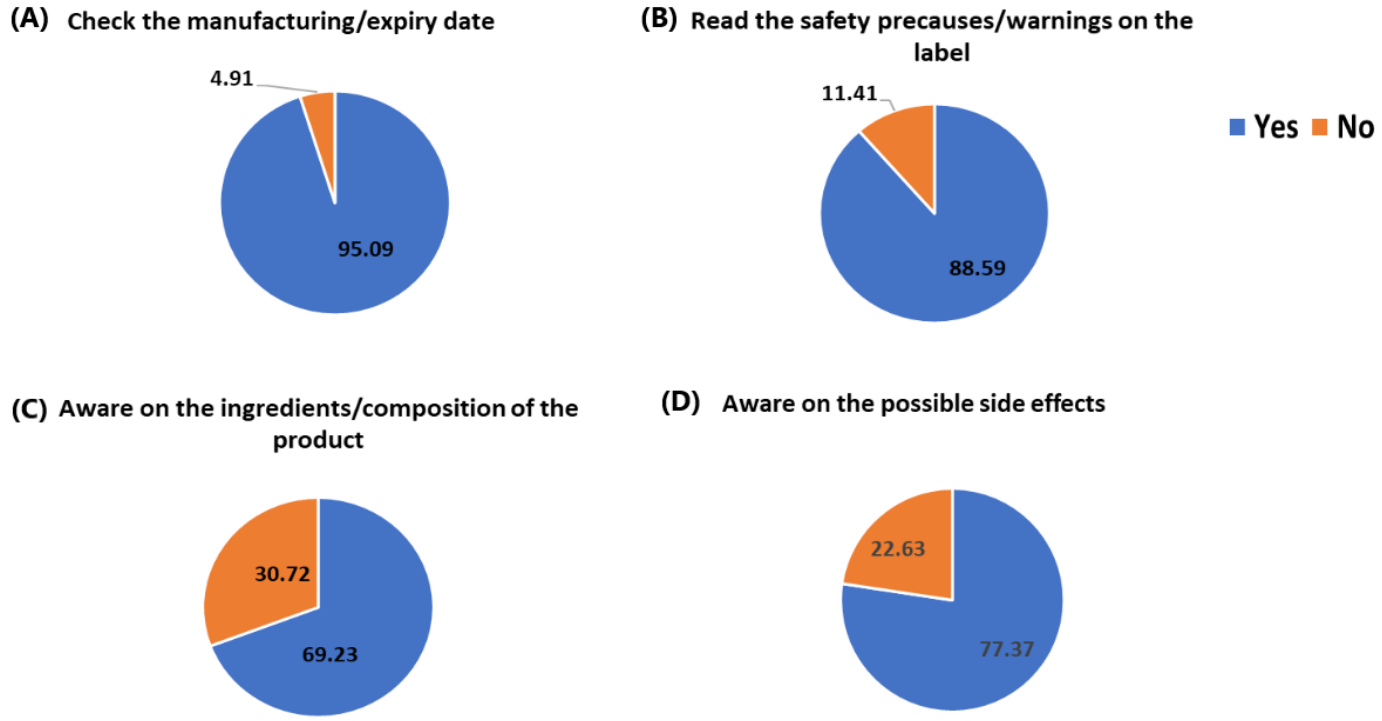


Figure 2. Consumer awareness during the selection of skin care products

Out of 221 respondents, nearly 90% of respondents (89.14%) had not experienced any noticeable adverse effects due to the use of skincare products and only 24 respondents (10.86%) had experienced some kind of adverse effects from the use of skincare products. The most common side effect

(6.79%) was reported as acne. In addition, nasal/eye irritation and itching were also reported. These adverse effects were observed due to the use of moisturizer creams (29.17%), sunscreens (25%), and anti-acne creams (20.83%).

This study revealed that consumers had some kind of trust in skincare products. The majority of the users (76.92%) were satisfied with the effectiveness of the products they were using and only 23.08% had a negative impression of the effectiveness of these products.

## Discussion

Being the largest organ in the human body, the skin is frequently exposed to various environmental conditions, chemical agents, and pathogenic organisms. Therefore skincare agents play a vital role in maintaining healthy skin conditions (1). As a continuation of our island-wide survey on evaluating the knowledge, attitudes, and practices regarding skincare agents in diverse communities in different administrative areas in Sri Lanka, the present study was conducted in Anuradhapura district in the North Central Province of Sri Lanka.

This study revealed that skincare agents were quite popular in the study area as over 50% of the participants were found to be regular users of such products. The skincare product usage was considerably low among males which might be due to their less attention and concern for having healthy skin. These observations correlate with the findings of Alsharif et al. (2022) where the usage of skin care products was significantly associated with the female gender ($p < 0.001$) as 74% of females in the study population used skin products (6). Moreover, Nitiyarom et al. (2022) also discovered a significant disparity in the usage of moisturizers, cosmetics, and sunscreens between female and male teenagers ($p = 0.001$, $p = 0.001$, and $p < 0.001$, respectively) as female teenagers had exhibited a much higher rate of using those cosmeceuticals than the male counterparts (3). In line with the findings of Napagoda et al. (2020), the present study also revealed that the economic status of the individuals was not a determinant factor for the majority of the consumers who use skincare products. This observation was further supported by the research conducted by Nitiyarom et al. (2022) in which the knowledge and practices did not significantly correlate with monthly allowance (3). Contrary to the observations made by Napagoda et al. (2020) in Galle district Sri Lanka, the regular users of skincare products in Anuradhapura district were quite aware of the composition and other important information mentioned on the labels of the products they were using. Interestingly, most of the users preferred herbal formulations over synthetic products while the side effects associated with the usage of skincare products were found to be very low. The quality of the product was found as the primary factor that influenced the choice of product while television advertisements and other media have significantly influenced consumer purchasing decisions. Sudipto et al. (2021) also observed similar results where 81.5% believed product quality was the most important factor while television and social media were identified as the main influencing sources (10) while a study conducted among females in Saudi Arabia revealed that 51% of the participants became acquainted with skincare products via various social media platforms (11).

Apart from purchasing herbal skincare products from the market, several individuals mentioned the in-house preparation of herbal skincare formulations using various plant materials available in their surroundings or purchased from Ayurvedic retail shops. These include plant species like Kokoona zeylanica, Aloe vera, Curcuma longa, and Azadirachta indica. On some occasions, these home-made formulations were prepared with the incorporation of adjuvants like lime juice, honey, coconut oil, yoghurt, etc. Most of the plant species utilized by the study population for home-made skincare formulations have been documented as dermatological remedies in the traditional medicine in the Indian subcontinent. For example, Aloe vera is recognized as a moisturizer while Azadirachta indica is reputed as a skin cleaner.

Similarly, Curcuma longa is well-known as a skin lightener (12). The collection of information regarding the herbal materials used as skincare agents would be beneficial to conduct bioactivity studies and thereby scientifically validate the efficacy for the development of novel herbal skincare agents at a commercial scale.

Although this was the first community-based study conducted on skincare product usage in Anuradhapura district, Sri Lanka, it did not represent all the cultures and races residing in the study area. The questionnaire was available only in English and Sinhala (the mother tongue of the majority of people in Sri Lanka) languages, thus the minor ethnic groups were under-represented. Moreover, the distribution of participants across age groups was not uniform as there was a lack of adequate representation for the age group categories of 46-55 years, 56-65 years and above 65. Therefore it is recommended to encompass individuals from diverse cultural, social, educational and economic backgrounds as well as varying age groups etc in future analogus studies to ensure more accurate representation of the community in study area.

## Conclusion

The study findings indicated the overall knowledge, attitudes, and practices concerning skincare agents among the inhabitants in Anuradhapura district, Sri Lanka. Significant usage of moisturizer creams was observed particularly among the age groups of 18–25 years 26–35 years. A statistically significant association was seen between the usage of skincare products and factors like gender, age, marital status, and level of education. The consumers were quite rational and were aware during the selection of a product. Furthermore, the study revealed the consumer preference towards green cosmetics.

### *Ethics approval and consent to participate*

The ethical approval was obtained from the Ethical Review Committee of the Faculty of Allied Health Sciences, University of Ruhuna, Sri Lanka, and prior informant's consent was obtained in writing from all the participants.

### *Competing Interest*

The authors declare that there is no competing interest.

### *Availability of data and materials*

All data generated or analyzed during this study are included in this published article.

### *Funding*

No external funding was received for this study.

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