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Research Article
Traditional Usage of Plants and Their Products for Cosmetic Purposes, A Survey Study from Cairo, Egypt

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Abstract

Background and Objective: The history of Egypt shows the richness of the plants which were used traditionally for many purposes including cosmetics. With the global trend of "back to nature" the need for natural products and chemical-free preparations becomes urgent. This is the first study that aims to observe, explore and document the traditional usage of plants and plant products for cosmetic purposes in the greater Cairo area and evaluate the Egyptians' knowledge of this. **Materials and Methods:** Two types of questionnaires were used for data gathering, initially from experts in natural cosmetics and latterly from users who are interested in using plants for cosmetics. Recorded data through valid questionnaires were tabulated and analysed simply, as well as, the relative frequency of citation (RFC) index and relative proportion difference (RPD) were measured. **Results:** Forty-two plant species were recorded with their economic importance in cosmetics, Lamiaceae was the most represented family (14.3%). Social media channels play a vital role in the knowledge and awareness formation for both experts and users of natural cosmetics. The findings reported that students were the top-ranked users of natural cosmetics (54.8%), which means that people's income in developing countries may govern the use of plants in cosmetics. **Conclusion:** The results showed an urgent need for recording the traditional unwritten data which is transferred orally through generations by encouraging the studies with similar aims. As well as the study recommends the development of the cosmetic industry by using organic and natural products instead of artificial and chemical materials.

Key words: Egyptian ethnobotanical survey, herbal beauty remedies, natural ingredients, traditional cosmetics, Lamiaceae, ethno-medicinal studies

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Naturally, plants provide countless benefits for all living organisms. Humans use plants and plant products for different needs as food, beverage, fiber, medicine, clothing and shelter. The way plant usage in basic needs is affected by human cultures and civilizations and plants formed a significant line in the human life image throughout history[1]. The historical records indicated that till the middle of the 19th century, indigenous plants were essential agents in human therapy and even nowadays they provide mankind with new traditional remedies continuously. These practices of plants and their products form traditional systems of knowledge, especially in developing and rural societies. This knowledge is continuously changing and transferring orally through generations over centuries providing a good and cheap alternative for health care systems[2,3]. According to estimates, about 80% of the world's population especially in developing nations and 90% in Africa depend on plants and products in traditional remedies regularly[4-10]. These unwritten data are subjected to missing and disappearance.

It is a fact that 25% of all medical preparations are originated and derived from plants and their derivatives[2,11-15]. Medicinal plants play an important role as a source of curative and preventive therapy for humankind[16-18]. Newman and Cragg[19] stated that nearly 50% of all current anti-cancer small molecules are prepared naturally from plants or their products.

The use of indigenous plants was extended from therapeutic practice to cosmetic purposes. Some factors negatively affect the beauty of skin and hair as weak health, imbalanced diet, hard job nature and extreme climate[20]. For example; the extremely hot and cold climatic conditions may change the melanin content of the skin, as well as result in freckles, wrinkles, blemishes, sunburns and pigmentation in hot tropical areas, in addition to skin cuts, cracks, maceration and even infections in areas with very cold seasons[21]. So that, plants have been used in recovering and improving human beauty throughout old history.

Lall and Kishore[22] reported that plants are used naturally for numerous cosmetic purposes worldwide as: For skin; against UV (Ultraviolet), wound curing, skin marks, spots and eczema coverage, conditioning, lightening, discoloration, anti-aging and antimicrobial; for hair; lotion, growing agent and perfume. Recently, with the industrial development in the field of drug' manufacture, the ability of plants and their extracts to treat and improve the beauty of skin, hair and the human body at all, makes them good sources for cosmetic products[23,24]. Some cosmetic products are pure chemicals, others are a mixture of chemicals and natural plant products; the common trend, nowadays, is going back to nature by using herbal cosmetics purely, with the precautions of meeting the technical and application standards required by society[20,21].

Egypt includes 2100 taxa belonging to 755 genera and 129 families[25], the richness and diversity of Egyptian flora made the use of plants for all life purposes including cosmetics dating back to the Pharaohs era[26]. One of these evidences were reported by the Ancient Egyptians Civilization which was known for its unique beauty in the ancient world. About 5000 years ago, Egyptians colored their hair and drew skin with a mixture of henna and indigo[27-29]. Thanks are due to Ebers Papyrus, which recorded 876 preparations of 328 natural constituents and documentary drawings that told us a lot about the customs of the ancient Egyptians in using plants to beautify their bodies from hair to toe[30].

Some of the ethno-medicinal studies of Egypt were published[31-35]. Up to date, Elansary *et al.*[36] was the only study that explored the practices of plants in Egypt for cosmetics focusing on Alexandria. The current study aims to survey, explore and document the traditional usage of plants and plant products for cosmetic purposes in Cairo, the capital of Egypt, as well as, to evaluate the Egyptians' knowledge of this.

MATERIALS AND METHODS

Study area: The data were collected from seven localities of greater Cairo, which extends from 30°11'10"N and 31°27'50"E near the Nile Delta. It is the largest urban area in Egypt and the largest metropolitan region in Africa and all over the world in the 16th century. It is about 3.3000 km^2 with total population estimated at 20,500,000. The total area occurred in three provinces: (1) Cairo Governorate, with 48%; (2) Parts of Giza Governorate, with 47% and (3) Parts of Qaliobiah with only 5% of the greater Cairo area[37-39]. Modern Cairo is an energetic city, as it is the capital of Egypt. Historically, it is associated with Ancient Egypt, where the famous pyramid and the city of Memphis are located in its geographical area[39].

Ethnobotanical data collection

Plant sampling: The study was based on 42 plant specimens collected from October, 2023 to March, 2024 with the aid of herbalists from different local and traditional markets in the study area. Identification of plants was done Ouasti and Elachouri[25] and Svike[40] classification and nomenclature updates were revised using the World Flora Online website[41]. Some specimens of the studied plants were kept as voucher specimens in the herbarium of the Faculty of Education, Ain Shams University, Cairo, Egypt.

Data collection: Data were collected using semi-structured interviews through two types of questionnaires designed for this purpose, one of them directed to herbalists or experts, with a total of 20 forms and the other for users or consumers, with a total of 163 forms (Appendices 1-2). Each questionnaire was formed of two parts: The first part included the demographic data of the respondents: As age, job, gender, educational level, residence and governorate, additionally, experts were asked about their years of experience and the source of their knowledge update (Table 1-2).

The second part asked about the data regarding the plant, such as plant name, preparation method, the best part used, the effective amount, targeted human body organ and the effectiveness and duration of use (Table 3-4). Questionnaires were distributed randomly in rural and urban areas, authors helped the informants to fill in the questionnaire, in addition to showing them some illustrations of the studied plants to facilitate recording the traditional importance of cosmetic purposes.

Data analysis: Data was analyzed using the Microsoft Excel 2010 software. The most useful plant species used for cosmetic purposes were indicated using the relative frequency of citation (RFC) index calculated using the Equation (1):

$$RFC = \frac{Fc}{N} (0 < RFC < 1) \quad (1)$$

Where:

Fc = Number of users claimed to use the plant for cosmetic purposes

N = Total number of respondents[42]

The awareness degree of users regarding the use of the plant species in cosmetics was calculated using the equation of relative proportion difference (RPD). Where the proportions of users' answers compared with those of experts regarding the target organ of cosmetic treatment as Equation (2)[43]:

$$RPD\ (\%) = \frac{P2 - P1}{P1} \times 100 \quad (2)$$

Where:

P1 = Proportion of responses of experts

P2 = Proportion of responses of users

RESULTS AND DISCUSSION

The ethnobotanical data regarding the use of plants for cosmetic purposes was pre-collected from the herbalists and the cosmetic experts whose treatments were based essentially on the plants and natural products. Twenty-two forms of the questionnaires which were designed especially for this purpose (Appendix 1) were distributed in seven traditional districts in the study area (Giza, Shoubra Al-Khaimah, Manshyt Al-Sadr, Al-Hussien, Al-Moaz Street, Cairo Down Town and Attaba) selecting the most famous experts in natural cosmetic treatments in the traditional markets for herbs. Few of them (only eight, 36.36%) were helpful and cooperative, they performed the interviews in a respected and enjoyable manner. Unfortunately, the majority of expert interviewees refused to answer any questions, that they were too busy and had no time, in addition, they preferred to keep their data to themselves, that they believe the secrets of their experiences representing a wealth they should keep rather than sharing it with others.

The valid questionnaires (8 forms) were collected and analyzed. Tables 1-2 show the demographic data concerning the experts and users respectively. Regarding the experts, all of them (100%) were males, from popular neighborhood residences and never attended workshops in the field of natural cosmetic treatments. These results express the reality of the Egyptian communities, that almost all herbalists are men and perform their work mostly in the popular neighborhoods. The majority (75%) were 30-60 years old, herbalists with an intermediate education, while (25%) were older than 60 years old, highly educated cosmetologists. Half of them (50%) were interviewed in Cairo Governorate, while the remaining were reported equally from Giza and Al Qaliobiah. Regarding the years of experience, half of them (50%) were 10-30 years, the other half were 10 years of experience. The majority of experts (87.5%) reported that social media is the way that they update their experience and follow up on the most recent knowledge in the field (Table 1), which reflect the vital role of social media in knowledge exchange and awareness formation.

The total number of questionnaires distributed to users (Appendix 2) was 163, only 115 were valid and used for data recording. Table 2 shows the demographic characteristics of users. The majority of them (88.7%) were females, younger than 30 years old (70.4%), students (54.8%), highly educated (68.6%), reported from popular neighbourhood residences (64.3%) expressing the commonness of using traditional ways in cosmetics in popular residences. These data reflect the interest of middle-aged, educated females in using plants and plant products in cosmetics. These results match what was reported in Egypt by AbouZid and Mohamed[31], Elansary *et al.*[36] and at the same time conflict with what was reported in some other countries: America[44]; Brazil[45] and Finland[46]. The people's income in developing countries may

Table 1: Demographic data for experts in natural cosmetics, collected through the semi-structural interviews in Cairo

Characteristics	Categories	Number	Percentage
Gender	Male	8	100
	Female	0	0
Age	Younger than 30	0	0
	30-60	6	75
	Older than 60	2	25
Job	Popular healer	0	0
	Attar "herbalist"	6	75
	Cosmetologist	2	25
Education level	Intermediate education	6	75
	Higher education	2	25
	Uneducated	0	0
Place of residence	Popular neighbourhood	8	100
	Village	0	0
	Classy neighbourhood	0	0
Governorate	Giza	2	25
	Al Qaliobiah	2	25
	Cairo	4	50
Years of experience	Less than 10	0	0
	Oct-30	4	50
	More than 10	4	50
Number of workshops	I never attended	8	100
	03-Oct	0	0
	More than 10	0	0
Desire to attend courses	I want	0	0
	I do not want	6	75
	Not interested	2	25
Means of knowledge update	Social media	7	87.50
	Television	0	0
	Scientific references	0	0
	Other	1	12.50

Table 2: Demographic data analysis for respondents = collected through the semi-structural interviews in Cairo

Characteristics	Categories	Number	Percentage
Gender	Male	13	11.30
	Female	102	88.70
Age	Younger than 30	81	70.40
	30-60	34	29.90
	Older than 60	0	0
Job	Student	63	54.80
	Employee	29	25.20
	No job	23	20
Education level	Intermediate education	35	30.40
	Higher education	79	68.60
	Uneducated	1	1
Place of residence	Popular neighborhood	74	64.30
	Village	32	27.90
	Classy neighborhood	9	7.80
Governorate	Giza	26	22.60
	Al Qaliobiah	59	51.30
	Cairo	30	26.10

govern the use of plants in cosmetics, the result supported this opinion that students (with less income) reported as the top-ranked users because they tend to use cheaper cosmetics in the form of natural and traditional formulas rather than using the expensive brands of cosmetics.

Of users (11.3%) were males, in addition, (29.9%) of users were aged 30-60 years, (25.2%) were employees and (20%) had no jobs. As well as, (30.4%) of users were with an intermediate education and only 1% were illiterate. The sacristy of users was reported from villages and classy neighborhoods with percentages of (27.9) and (7.8%), respectively. About (26.1%) of users were interviewed from Cairo, while (22.6%) were from Giza.

Table 3: Plant information collected from questionnaires distributed for experts

No.	Scientific name	Arabic name	Part used	Target organ	Way of use	Duration of use	Effect	Extra data
1	*Allium oleraceum* L.	Thoom	Fruit	Hair	Use oil like lotion	Once a week	Good	For hair loss and hair extension treatment
2	*Aloe officinalis* Forssk.	Sabar	Leaves	Hair-skin	Hair and skin ointment	Once a day/twice weekly	Good	Gel and oil are used to soften and moisturize skin Used for hair nourishing, preventing hair loss and treat dandruff
3	*Argania spinosa* Skeels	Argan	Fruit	Hair-skin	As a lotion	For the skin (daily)-use as an oil bath twice	Good	For hair nourishing, softening, treating hair loss For skin and body moisturizing
4	*Boswellia carteri* Birdw.	Loban	Resin	Skin	As an oil or used as a daily mask by soaking it in water	Daily	Very good	For collagen and skin freshness or as a toner for the skin
5	*Citrus limon* (L.) Osbeck	Limon	Seeds	Skin-hair	Use oil like lotion	More than 30 days	Good	Works to reduce the pores of the skin and moisturize the skin Give the hair shine and softness
6	*Cocos nucifera* L.	Joz el hind	Fruit	Hair-skin	Use as a drink or eaten as a fruit-its oil extract serve as a lotion	Daily	Excellent	An aromatic oil moisturizes the hair and the entire body. The fruit itself is edible, which works as a memory treatment
7	*Cucurbita pepo* L.	Qaara'	Seeds	Hair	Lotion	Once a week	Good	It used to treat hair loss as an oil bath
8	*Cymbopogon citratus* L.	Hashisha limon	Seeds	Hair	Use oil like lotion	Once a week	Good	For hair extension
9	*Cyperus rotundus* L.	Soaad	Seeds	Skin	Is used either boiled and soaked or the oil is extracted from the seeds	When need	Excellent	Used without any additives for the entire body to remove body hair
10	*Daucus carota* L.	Jazar	Seeds	Hair-skin	Use oil like lotion	More than 30 days	Good	To increase hair density, moisturize hair and relieve dandruff Moisturize the skin
11	*Equisetum hyemale* L.	Zail Hosan	Whole plant	Hair	Use oil like lotion	Twice a week	Good	For hair loss treatment
12	*Eruca vesicaria* (L.) Cav.	Jarjir	Leaves	Hair	Cold pressed	Once a week	Excellent	Is used as an oil bath to treat hair loss
13	*Glycyrrhiza glabra* L.	Eraq Sous	Seeds	Skin	Boiled	Twice a week	Good	Used for skin lightening and toning
14	*Laurus nobilis* L.	Loura	Leaves	Hair	Boiled	Daily	Good	It sprayed on the hair scalp and included in hair formations
15	*Lavandula officinalis* L.	Lavandour	Leaves	Skin-hair	Oil is extracted and used as an ointment	Daily	Excellent	It is used in the manufacture of perfumed body oil and scented cosmetic soap for skin and hair cosmetic use
16	*Lawsonia inermis* L.	Henna	Leaves	Skin-hair	Leaves powder	Twice a month	Good	Therapeutic and cosmetic as a dye for hair and skin
17	*Linum usitatissimum* L.	Ketan	Seeds	Hair-skin	Use oil as a lotion	Twice a week	Good	Its effectiveness appears after a month as a hair softener and natural collagen for the skin
18	*Lupinus luteus* L.	Termes	Seeds	Skin	Powder	Twice a week	Good	Ground lupine is used to make facial masks. It is used as a facial scrub and a mask to lighten the skin
19	*Matricaria chamomilla* L.	Camomeil	Flowers	Skin	Is then boiled as a syrup and its oil extracted	Daily	Excellent	As a skin lightening and a drink to treat the digestive system and allergies
20	*Melaleuca alternifolia* Cheel	Shaee	Leaves	Hair-skin	An ointment	Twice a week	Good	To treat skin pimples Used to treat hair loss. It is applied to the scalp as an oil bath before washing and the results appear after a month of use
21	*Nigella sativa* L.	Habit El barka	Seeds	Skin	Powdered and boiled	Once a day	Good	As a powder in making masks to treat acne and lighten the skin, it is used as a spray decoction
22	*Ocimum basilicum* L.	Rehan	Whole plant	Skin-hair	Use oil as lotion	Twice a week	Good	The tea of fresh leaves and oil can be used for skin and hair treatment
23	*Olea europaea* L.	Zitoon	Fruit	Hair	Ointment	Twice a week	Excellent	Is used as a hair oil bath that moisturizes and softens the hair

Table 3: Continue

No.	Scientific name	Arabic Name	Part used	Target organ	Way of use	Duration of use	Effect	Extra data
24	*Persea americana* Mill	Avocado	Seeds	Hair-skin	Ointment	Apply daily or oil bath twice a week	Good	Fresh fruit and oil can used for hair and skin treatment
25	*Petroselinum crispum* L.	Bakdonis	Seeds	Hair	Ointment	Once a week	Good	Oil can used for skin and hair treatments
26	*Plantago ovata* Forssk.	Qatoona	Seeds	Skin	Powder	Once a week	Good	Used as a cosmetic face mask
27	*Prunus dulcis* D.A.Webb	Loaz Mur/Helw	Seeds	Hair-skin	Oil is used as lotion	Once a week	Good	For dark circles and to soften hair
28	*Ricinus communis* L.	Kharoaa'	Seeds	Hair	Lotion is used as an oil bath	Once a week	Excellent	Is used to thicken hair and eyelashes
29	*Rosa x alba* L.	Ward	Flowers	Hair-skin	Flowers are used to extract rose water as an ointment	More than 30 days	Good	For hair, used to treat infections in the scalp, treats dandruff and is used to moisturize and lighten the skin
30	*Rosmarinus officinalis* L.	Rosmary	Leaves	Hair	Oil is extracted and used as an ointment	Twice a week	Good	Diluted essential oil as a mixture with other oils is used for hair treatment
31	*Salvia hispanica* L.	Shaeea	Seeds	Hair-skin	Ointment	Daily application or oil bath twice a week	Good	Used diluted with other hair oils for skin and hair treatment
32	*Salvia officinalis* L.	Marmaryah	Whole plant	Hair	Lotion	Twice a week	Good	Used as an oil bath for hair softness twice a week because its consistency is heavy
33	*Sesamum indicum* L.	Semsem	Seeds	Hair	Lotion	Once a week	Good	Oil in combinations with other oils and vinegar used for hair straightening
34	*Simmondsia chinensis* (Link) C.K.Schneid.	Jojoba	Seeds	Hair	Oil is extracted and the scalp is massaged with it	Twice a week	Excellent	Its therapeutic and cosmetic use is to moisturize and thicken hair
35	*Sinapis alba* L.	Khardal	Seeds	Hair	It is used as a powder or the oil is extracted from the seeds and is also used as an ointment	More than 30 days	Excellent	It is preferable to mix with other oils such as sesame, coconut and sweet almond to give the best results It is used to treat hair loss and thickening
36	*Syzygium aromaticum* (L.) Merr. & L.M.Perry	Quronfol	Fruit	Hair	Lotion	Once or twice a day	Good	For hair treatment, but If there is an allergy, it is prohibited to be used
37	*Thymus vulgaris* L.	Zaatar	Leaves	Hair	Use oil like lotion	Twice a week	Good	It is included in combinations with other oils, used for hair loss treatment
38	*Trigonella gladiata* Steven ex M.Bieb.	Helbah	Seeds	Skin	Lotion and face mask	3 times a week	Excellent	Beautification of the face
39	*Triticum aestivum* L.	Janin Qamh	Fruit	Hair-skin	Ointment	Once a day as an oil bath or skin lotion	Good	For hair: To treat hair loss and soften hair For the skin: Moisturizing and freshening the skin
40	*Vitis vinifera* L.	Enaab	Seeds	Hair	Use oil like lotion	More than 30 days	Very good	Softens and moisturizes hair-promotes hair growth and unifies the complexion
41	*Zea mays* L.	Nesha Zora	Starch	Skin	Use the grains to extract the powder from them as a mask	More than 30 days	Very good	Works to soften and remove dead cells from the skin, lighten the skin and remove acne from the skin
42	*Ziziphus spina-christi* (L.) Willd.	Seder	Leaves	Hair	Use oil like lotion	Twice a week	Good	Hair loss treatment

Table 4: Plant information collected from questionnaires distributed for users

No.	Scientific name	Arabic name	Family	Part used	How to prepare	Target organ	Type of use	Way to use	Duration of use (days)	Effective	RFC
1	*Allium oleraceum* L.	Thoom	Amaryllidaceae	Fruit	Drenched	Hair	Therapeutic	Cream	Less than 10	Excellent	**0.55**
2	*Aloe officinalis* Forssk.	Sabar	Asphodelaceae	Leaves	Drenched	Skin	Cosmetic	Cream	Less than 10	Excellent	0.80
3	*Argania spinosa* Skeels	Argan	Sapotaceae	Seeds	Drenched	Hair	Cosmetic	Cream	Less than 10	Good	0.95
4	*Boswellia carteri* Birdw.	Loban	Burseraceae	Resin	Drenched	Skin	Cosmetic	Cream	Less than 10	Good-excellent	1.00
5	*Citrus limon* (L.) Osbeck	Limon	Rutaceae	Seeds	Boiled	Skin	Cosmetic	Cream	Less than 10	Good	1.00
6	*Cocos nucifera* L.	Joz el hind	Arecaceae	Fruit	Powder	Hair	Cosmetic	Cream	Less than 10	Excellent	**0.59**
7	*Cucurbita pepo* L.	Qaara'	Cucurbitaceae	Seeds	Drenched	Hair	Therapeutic	Cream	Less than 10	Good	0.76
8	*Cymbopogon citratus* L.	Hashisha limon	Poaceae	Stem	Boiled	Hair	Cosmetic	Cream	10-30	Good	0.69
9	*Cyperus rotundus* L.	Soaad	Cyperaceae	Seeds	Boiled	Skin	Cosmetic	Cream	Less than 10	Good-excellent	**0.47**
10	*Daucus carota* L.	Jazar	Apiaceae	Seeds	Boiled	Skin-Hair	Cosmetic	Cream	Less than 10	Good	1.00
11	*Equisetum hyemale* L.	Zail Hosan	Equisetaceae	Leaves	Boiled	Hair	Therapeutic	Cream	Less than 10	Good	**0.42**
12	*Eruca vesicaria* (L.) Cav.	Jarjir	Brassicaceae	Leaves	Drenched-boiled	Hair	Cosmetic	Cream	Less than 10	Good-excellent	0.90
13	*Glycyrrhiza glabra* L.	Eraq Sous	Fabaceae	Stem	Powder-drenched	Skin	Cosmetic	Cream	Less than 10	Good	1.00
14	*Laurus nobilis* L.	Loura	Lauraceae	Leaves	Boiled	Hair	Therapeutic cosmetic	Cream	Less than 10	Excellent	1.00
15	*Lavandula officinalis* L.	Lavandour	Lamiaceae	Leaves	Drenched	Skin	Cosmetic	Cream	Less than 10	Excellent	**0.47**
16	*Lawsonia inermis* L.	Henna	Lythraceae	Leaves	Powder	Skin-Hair	Cosmetic	Cream	Less than 10	Excellent	1.00
17	*Linum usitatissimum* L.	Ketan	Linaceae	Seeds	Drenched	Hair	Cosmetic	Cream	Less than 10 once a week	Excellent	1.00
18	*Lupinus luteus* L.	Termes	Fabaceae	Seeds	Powder	Skin	Cosmetic	Cream	Less than 10	Excellent	0.94
19	*Matricaria chamomilla* L.	Camomeil	Asteraceae	Seeds	Boiled	Skin-Hair	Domestic cosmetic	Beverage	Less than 10	Good	**0.53**
20	*Melaleuca alternifolia* Cheel	Shaee	Myrtaceae	Leaves	Boiled	Skin	Cosmetic	Cream	Less than 10	Good	0.95
21	*Nigella sativa* L.	Habit El barka	Ranunculaceae	Seeds	Boiled	Hair	Cosmetic	Cream	Less than 10	Excellent	0.90
22	*Ocimum basilicum* L.	Rehan	Lamiaceae	Leaves and seeds	Boiled-drenched-oil extract	Skin	Cosmetic	Oil	Less than 10	Good	1.00

Table 4: Continue

No.	Scientific name	Arabic name	Family	Part used	How to prepare	Target organ	Type of use	Way to use	Duration of use in days	Effective	RFC
23	*Olea europaea* L.	Zitoon	Oleaceae	Fruit	Drenched	Hair	Therapeutic	Cream	Less than 10	Excellent	1.00
24	*Persea americana* Mill	Avocado	Lauraceae	Seeds	Oil extract	Hair	Cosmetic	Cream	Less than 10	Good	1.00
25	*Petroselinum crispum* L.	Bakdonis	Apiaceae	Seeds	Boiled	Hair	Cosmetic	Cream	Less than 10	Good	1.00
26	*Plantago ovata* Forssk.	Qatoona	Plantaginaceae	Seeds	Boiled	Skin	Cosmetic	Beverage	10-30	Good	0.85
27	*Prunus dulcis* D.A.Webb	Loaz Mur/Helw	Rosaceae	Seeds	Boiled-drenched-oil extract	Hair	Cosmetic	Cream	Less than 10	Good	1.00
28	*Ricinus communis* L.	Kharoaa'	Euphorbiaceae	Seeds	Drenched	Hair	Cosmetic	Cream	Less than 10	Excellent	0.85
29	*Rosa x alba* L.	Ward	Rosaceae	Leaves	Drenched	Skin-Hair	Cosmetic	Cream	Less than 10	Good	1.00
30	*Rosmarinus officinalis* L.	Rosmary	Lamiaceae	Leaves	Boiled	Hair	Therapeutic	Cream	Less than 10	Excellent	**0.59**
31	*Salvia hispanica* L.	Shaeea	Lamiaceae	Seeds	Drenched	Hair	Cosmetic	Cream	Less than 10	Good	1.00
32	*Salvia officinalis* L.	Marmaryah	Lamiaceae	Leaves	Boiled	Hair	Therapeutic	Cream	Less than 10	Good	1.00
33	*Sesamum indicum* L.	Semsem	Pedaliaceae	Seeds	Boiled	Hair	Cosmetic	Cream	Less than 10	Good	0.65
34	*Simmondsia chinensis* (Link) C.K.Schneid.	Jojoba	Simmondsiaceae	Seeds	Powder	Hair	Therapeutic	Cream	Less than 10	Excellent	0.82
35	*Sinapis alba* L.	Khardal	Brassicaceae	Seeds	Powder	Skin-Hair	Domestic	Beverage	Less than 10	Excellent	**0.59**
36	*Syzygium aromaticum* (L.) Merr. & L.M.Perry	Quronfol	Myrtaceae	Seeds	Boiled	Hair	Cosmetic	Cream	Less than 10	Excellent	1.00
37	*Thymus vulgaris* L.	Zaatar	Lamiaceae	Leaves	Boiled	Skin-hair	Therapeutic	Cream	Less than 10	Good	0.63
38	*Trigonella gladiata* Steven ex M.Bieb.	Helbah	Fabaceae	Seeds	Boiled	Skin	Therapeutic-cosmetic	Beverage	Less than 10	Good	0.79
39	*Triticum aestivum* L.	Janin Qamh	Poaceae	Seeds	Drenched	Hair	Therapeutic	Cream	Less than 10	Good	1.00
40	*Vitis vinifera* L.	Enaab	Vitaceae	Fruit	Boiled	Hair	Cosmetic	Cream	Less than 10	Good	1.00
41	*Zea mays* L.	Nesha Zora	Poaceae	Seeds	Powder	Skin-hair	Cosmetic	Cream	Less than 10	Good	1.00
42	*Ziziphus spina-christi* (L.) Willd.	Seder	Rhamnaceae	Leaves	Boiled	Hair	Therapeutic	Beverage-cream	10-30	Good	0.80

RFC: Relative frequency of citation index and the bold values indicate the species with the lowest RFC

Table 5: Families of the recorded plant species used in natural cosmetics as recorded by experts

Family	Number	Percentage
Lamiaceae	6	14.3
Poaceae	3	7.1
Fabaceae	3	7.1
Rosaceae	2	4.8
Myrtaceae	2	4.8
Lauraceae	2	4.8
Brassicaceae	2	4.8
Apiaceae	2	4.8
20 families	20	47.6

Table 6: Percentage of target organ as recorded by experts

Target organ	Number	Percentage
Hair only	18	42.86
Skin only	9	21.43
Hair and skin	15	35.71

The botanical data collected through the second part of the questionnaire forms were tabulated and analysed according to the expert's and users' responses. Tables 3-4 show the botanical knowledge of experts and users respectively regarding a selection of the most important plants used for cosmetic purposes by Egyptians. The plant species recorded in this study were 42 distributed in 28 families (Table 5). Lamiaceae was the most representative family with a percentage of 14.3%, followed by Poaceae and Fabaceae which represented equally 7.1%. Five families, i.e., Rosaceae, Myrtaceae, Lauraceae, Brassicaceae and Apiaceae were represented equally by two species for each with a percentage of 4.3%, while the remaining 20 included families (Table 4) were represented by single species for each (Table 5).

Lamiaceae is an aromatic family, its plants are characterized by the high content of essential oils which give them both medical and cosmetic importance[35,47]. On the other side, 3% of the flora of Egypt includes in Lamiaceae which is represents hundreds of species and cultivars[48,49]. These species are locally and globally with high medicinal and cosmetic significance like Basil, Rosemary, Lavender, Mint, Oregano, etc.[50]. These two reasons may support the current result and make the top abundant of Lamiaceae is expected and not surprising. This result matches what was reported in Egypt by AbouZid and Mohamed[31], Elansary *et al.*[36]; in America by Moerman *et al.*[51]; in Morocco by Khabbach *et al.*[52]; in Pakistan by Anwar *et al.*[53] and in Iran by Nasab and Khosravi[54].

Seeds, fruits and leaves were the most plant parts used as a source of cosmetic preparations as observed in this study, while only two plant products were recorded: Resin from *Boswellia carteri* and starch from *Zea mays*. As shown in Table 6, the human organs targeted by the natural cosmetic preparations were recorded in three categories: Skin only (21.43%), hair only (42.86%) and hair and skin (35.71%). The effectiveness of the suggested preparations was recorded by experts, in addition to extra data regarding each plant (Table 3). The current study is based on these 42 suggested and recommended plants by experts. The questionnaires designed for users were distributed asking them about these 42 plants to record their knowledge and awareness about them. The valid responses of users were tabulated and analyzed in Table 4.

The initial outcomes of the study show the high knowledge degree of the informants about the use of plants and their products for cosmetic purposes, including the preparations, formulas, duration and effectiveness. The total awareness of the users was recorded as RFC index according to their responses regarding the surveyed plants (Table 4). The general awareness of users recorded low degrees (less than 0.6) regarding eight out of the 42 plants, they are: *Allium oleraceum* L., *Cocos nucifera* L., *Cyperus rotundus* L., *Equisetum hyemale* L., *Lavandula officinalis* L., *Matricaria chamomilla* L., *Rosmarinus officinalis* L. and *Sinapis alba* L.

It means that more than 40% of informant users have no idea about these plants and their importance in cosmetic treatments generally. The remaining plants gained high degrees of user awareness (more than or equal to 60%) as shown in Table 4.

Users responses were compared with what was reported by the experts to measure the degree of knowledge and awareness of the Egyptian users of natural cosmetics regarding species specifically. The number and percentages of users who cited the use of each species in the cosmetic of a particular organ (skin, hair, skin-hair) were compared with what was recorded by experts for the same species and organ. Regarding the target organ, the measurement of relative proportion differences (RPD) percentage of users' data with

Table 7: Users' awareness regarding the use of plants for cosmetics, calculated by the relative proportion difference (RPD)

No.	Scientific name	Target organ	X1	N1	P1 (%)	X2	N2	P2 (%)	RPD (%)
1	*Allium oleraceum* L.	Hair	8	8	100	5	11	45.5	-54.55
2	*Aloe officinalis* Forssk.	Hair-skin	8	8	100	12	16	75.0	-25.00
3	*Argania spinosa* Skeels	Hair-skin	8	8	100	5	19	26.3	-73.68
4	*Boswellia carteri* Birdw.	Skin	8	8	100	10	17	58.8	-41.18
5	*Citrus limon* (L.) Osbeck	Hair-skin	7	8	87.5	9	20	45.0	-48.57
6	*Cocos nucifera* L.	Hair-skin	8	8	100	8	10	80.0	-20.00
7	*Cucurbita pepo* L.	Hair	6	8	75	3	13	23.1	-69.23
8	*Cymbopogon citratus* L.	Hair	7	8	87.5	5	9	55.6	-36.51
9	*Cyperus rotundus* L.	Skin	8	8	100	7	8	87.5	-12.50
10	*Daucus carota* L.	Hair-skin	5	8	62.5	6	20	30.0	-52.00
11	*Equisetum hyemale* L.	Hair	6	8	75	2	5	40.0	-46.67
12	*Eruca vesicaria* (L.) Cav.	Hair	8	8	100	13	18	72.2	-27.78
13	*Glycyrrhiza glabra* L.	Skin	5	8	62.5	15	17	88.2	**41.18**
14	*Laurus nobilis* L.	Hair	8	8	100	14	17	82.4	-17.65
15	*Lavandula officinalis* L.	Hair-skin	6	8	75	5	8	62.5	-16.67
16	*Lawsonia inermis* L.	Hair-skin	8	8	100	15	17	88.2	-11.76
17	*Linum usitatissimum* L.	Hair-skin	6	8	75	10	17	58.8	-21.57
18	*Lupinus luteus* L.	Skin	8	8	100	11	17	64.7	-35.29
19	*Matricaria chamomilla* L.	Skin	7	8	87.5	6	9	66.7	-23.81
20	*Melaleuca alternifolia* Cheel	Hair-skin	7	8	87.5	8	19	42.1	-51.88
21	*Nigella sativa* L.	Skin	7	8	87.5	11	18	61.1	-30.16
22	*Ocimum basilicum* L.	Hair-skin	7	8	87.5	14	18	77.8	-11.11
23	*Olea europaea* L.	Hair	7	8	87.5	20	20	100.0	**14.29**
24	*Persea americana* Mill	Hair-skin	8	8	100	11	20	55.0	-45.00
25	*Petroselinum crispum* L.	Hair	8	8	100	10	20	50.0	-50.00
26	*Plantago ovata* Forssk.	Skin	6	8	75	7	11	63.6	-15.15
27	*Prunus dulcis* D.A.Webb	Hair-skin	8	8	100	19	20	95.0	-5.00
28	*Ricinus communis* L.	Hair	7	8	87.5	14	17	82.4	-5.88
29	*Rosa x alba* L.	Hair-skin	6	8	75	17	20	85.0	**13.33**
30	*Rosmarinus officinalis* L.	Hair	6	8	75	8	10	80.0	**6.67**
31	*Salvia hispanica* L.	Hair-skin	8	8	100	15	20	75.0	-25.00
32	*Salvia officinalis* L.	Hair	6	8	75	13	20	65.0	-13.33
33	*Sesamum indicum* L.	Hair	8	8	100	10	13	76.9	-23.08
34	*Simmondsia chinensis* (Link) C.K.Schneid.	Hair	8	8	100	11	14	78.6	-21.43
35	*Sinapis alba* L.	Hair	8	8	100	6	10	60.0	-40.00
36	*Syzygium aromaticum* (L.) Merr. and L.M.Perry	Hair	7	8	87.5	9	17	52.9	-39.50
37	*Thymus vulgaris* L.	Hair	7	8	87.5	8	12	66.7	-23.81
38	*Trigonella gladiata* Steven ex M.Bieb.	Skin	8	8	100	12	15	80.0	-20.00
39	*Triticum aestivum* L.	Hair-skin	8	8	100	14	20	70.0	-30.00
40	*Vitis vinifera* L.	Hair	6	8	75	11	20	55.0	-26.67
41	*Zea mays* L.	Skin	8	8	100	20	20	100.0	**0.00**
42	*Ziziphus spina-christi* (L.) Willd.	Hair	8	8	100	15	16	93.8	-6.25

X1: Number of experts' responses, N1: Total number of experts, P1=Proportion of experts' responses, X2: Number of users' responses to the use of each plant in accordance with the experts, N2: Total number of users reported the use of each plant, P2: Proportion of users' responses, RDP (%): Relative proportion differences percentage and the bold values show the species with RPD more than or equal to "0"

reference to experts revealed that only 5 out of 42 studied species (12%) matched the answers of experts positively (the relative difference was more than or equal to "0") as illustrated in Table 7. These plants were: *Glycyrrhiza glabra* L., *Olea europaea* L., *Rosa x alba* L., *Rosmarinus officinalis* L. and *Zea mays* L. The remaining plants (37. 88%) reported negative values of RPD which reflects the wide range of differences between users' and experts' responses regarding the human organ targeted by cosmetic treatment.

This result means the need for more awareness programs directed to users regarding the beneficial and effective use of these plants for cosmetic purposes of skin, hair or both. At the same time, further analysis using more advanced statistical methods is recommended.

CONCLUSION

For the first time, this study recorded the traditional usage of plants and plant products for cosmetic purposes recently in Greater Cairo Area, in addition to evaluating the Egyptians' awareness of these practices. The results showed an urgent need for recording the traditional unwritten data, which is

transferred orally through generations by encouraging studies with similar aims. As well as the study recommends the development of the cosmetic industry by using organic and natural products and backing to nature instead of artificial and chemical materials. The study also recommended organizing a national committee or association that includes the experts, herbalists and cosmetologists to provide them with support, trusted knowledge, helpful workshops and keeping their rights. Due to the considerable awareness of the Egyptians toward natural cosmetics, the study recommended wider awareness programs directed to all people categories through social media channels as they are the most effective.

SIGNIFICANCE STATEMENT

With the global trend "Back to Nature" the need for natural preparations becomes urgent in all lifestyles. This is the first study that aims to document the traditional use of plants for cosmetic purposes in Cairo. Forty-two plant species were recorded with their economic importance in cosmetics. The results showed an urgent need for recording the traditional unwritten data, as well as the need for wider awareness programs should be directed to all people categories inducing them to use natural cosmetic products because of their efficiency and safety.

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Appendix 1: Questionnaire form was designed to collect traditional data from experts regarding using plants and their products for cosmetic purposes in Cairo, Egypt

Traditional usage of plants and plant products for cosmetic purposes. A survey study from Cairo, Egypt

Expert form

A: Respondent data:					
Name (optional):		Telephone (optional):			
Data recording date:					
1: Gender		Male			Female
2: Age	Younger than 30	30-60	Older than 60		Other
3: Education level	Intermediate education	High education	Uneducated		Other
4: Place of residence	Popular neighbourhood	Village	Classy neighborhood		Other
5: Governorate	Giza	Al Qaliobiah	Cairo		Other
6: Job	Student	Employee	No job		Other
7: Years of experience	Less than 10	Oct-30	More than 10		Other
8: Number of workshops	I never attended	03-Oct	More than 10		Other
9: Desire to attend courses	I want	I do not want	Not interested		Other
10: Means of knowledge update	Social media	Television	Scientific references		Other
B: Plant information:					
Scientific name:					
Common name:					
11: Part used	Root	Stems	Leaves	Fruit/seeds	Other
12: How to prepare	Boiled	Drenched	Powder		Other
13: Amount (g)	More than 300	100-300	Less than 100		Other
14: Target organs	Skin		Hair		Other
15: Type of use	Therapeutic	Cosmetic	Domestic		Other
16: Way to use	Cream	Beverage	day		Other
17: Duration of use (days)	More than 30	10-30	Less than 10		Other
18: Effectiveness	Good	Excellent	Poor		Other

Additional data:

Appendix 2: Questionnaire form is designed to collect traditional data from the users of plants and their products for cosmetic purposes in Cairo, Egypt

Traditional usage of plants and plant products for cosmetic purposes. A survey study from Cairo, Egypt

User form

A: Respondent data:					
Name (optional):					
Data recording date:					
1: Gender		Male			Female
2: Age	Younger than 30	30-60	Older than 60		Other
3: Education level	Intermediate education	High education	Uneducated		Other
4: Place of residence	Popular neighbourhood	Village	Classy neighborhood		Other
5: Governorate	Giza	Al Qaliobiah	Cairo		Other
6: Job	Student	Employee	No job		Other
B: Plant information:					
Scientific name:					
Common name:					
7: Part used	Root	Stems	Leaves	Fruit/seeds	Other
8: How to prepare	Boiled	Drenched	Powder		Other
9: Amount (g)	More than 300	100-300	Less than 100		Other
10: Target organs	Skin		Hair		Other
11: Type of use	Therapeutic	Cosmetic	Domestic		Other
12: Way to use	Cream	Beverage	Day		Other
13: Duration of use (days)	More than 30	10-30	Less than 10		Other
14: Effectiveness	Good	Excellent	Poor		Other

Additional data: