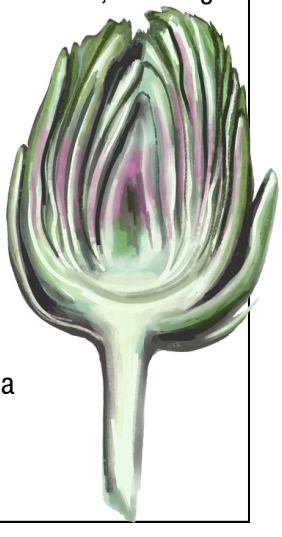
Cynara scolymus L.

ardanatura

Pablo Neruda dedicated passionate verses to it, celebrating its spiny armor and tender heart. In 1947, Marilyn Monroe was crowned “Artichoke Queen” during the first festival dedicated to it in Castroville, California. And in the kitchen?

It’s a versatile star, capable of everything from crispy frying to the delicate “alla romana” preparation, all the way to the spectacular simplicity of the “alla giudia” recipe.

But beyond being a pop icon and a culinary delight, the artichoke is also a true ally of well-being. In this article, we’ll explore its main nutraceutical properties and its most interesting uses in cosmetics, blending herbal tradition and scientific innovation.



Its scientific name is Cynara scolymus, a perennial plant [1] native to the Mediterranean region, a cultivated variety of a thistle species grown as food [2]. There are both wild forms and cultivated varieties (cultivars) [3]. This plant was traditionally used as food among the ancient Greeks and Romans [4].

It is a pharmacologically important medicinal plant containing phenolic acids and flavonoids. Experimental studies indicate antioxidant and hepatoprotective effects of C. scolymus, though no studies have been conducted on its therapeutic effects on liver diseases [6, 7]. *Cynara scolymus L.* (Asteraceae) (artichoke) is commonly consumed as a vegetable. Its leaves are frequently used in folk medicine for the treatment of hepatitis, hyperlipidemia, obesity, and dyspepsia.

ARDA NATURA PROPOSAL

- 006869 E.GLICERICO CARCIOFO U.A. - Glycerin, Aqua, Cynara scolymus Leaf Extract
- 005427 E.G. CARCIOFO 1:2 PE - Propylene Glycol, Aqua, Cynara scolymus Leaf Extract

COSMETIC EFFICACY*

- ☑ ENHANCE SKIN APPEARANCE
- ☑ DECREASE SKIN ROUGHNESS
- ☑ ANTI-WRINKLES
- ☑ IMPROVE SKIN RADIANCE
- ☑ ANTIOXIDANT**
- ☑ ANTI-POLLUTION

*claim derived and synthesized, see bibliography

** tested also after UVA - exposure

EFFICACIA NUTRACEUTICA

leaves

- ☑ DIGESTIVE FUNCTION
- ☑ LIVER FUNCTION
- ☑ ELIMINATION OF INTESTINAL GAS
- ☑ DETOXIFYING FUNCTIONS OF THE BODY
- ☑ LIPID METABOLISM
- ☑ ANTIOXIDANT

buds

- ☑ DIGESTIVE FUNCTION
- ☑ LIVER FUNCTION
- ☑ PROMOTION OF BODY FLUID DRAINAGE
- ☑ SUPPORT OF URINARY TRACT FUNCTION

INTRODUCTION

Cynara scolymus L or artichokes is a perennial plant [1] native to the Mediterranean region a variety of species of thistle cultivated as a food [2]. Both wild forms and cultivated varieties (cultivars) exist [3]. This vegetable grows to 1.4–2 m tall, with arching, deeply lobed, silvery, glaucous-green leaves 50–82 cm long. This plant was traditionally used as a food among the ancient Greeks and Romans [4]. In North Africa, where it is still found in the wild state, the seeds of artichokes, probably cultivated, were found during the excavation of Roman-period Mons Claudianus in Egypt [5]. *Cynara scolymus* is a pharmacologically important medicinal plant containing phenolic acids and flavonoids. Experimental studies indicate antioxidant and hepatoprotective effects of C. scolymus but there have been no studies about therapeutic effects of liver diseases [6, 7]. *Cynara scolymus L*. (Asteraseae) (artichoke) is commonly eaten as a vegetable; its leaves are frequently used in folk medicine in the treatment of hepatitis, hyperlipidemia, obesity and dyspeptic.

Maryem Ben Salem et al. [8] quantified *Total Phenolics, Flavonoids, and Tannins Contents of Cynara scolymus Leaves Extracts* from *C. scolymus* dried leaves obtained from the region of Bizerte in north of Tunisia with interesting results:

Extract	Cardiac Glycosides	Triterpenoids	Saponins	Flavonoids Tannin	Alkaloid
+	+	+	+	+	+

Table 1: Phytochemical analysis of *Cynara scolymus* extracts leaves. ALE = Articoke Leaf Extract. Sign (+) indicates being present.

Constituents	*Cynara scolymus* leaves (percentage dry weight basis)
Dry Matter	97.03 ± 0.43
Ash	15.81 ± 0.01
Carbohydrate	80.05 ± 0.69
Proteins	16.64±1.79
Lipids	3.41 ± 0.45
Total sugars	1.97 ± 0.10
Dietary fiber	71.60 ± 0.81

Table 2: Proximate analysis of dried leaves of *Cynara scolymus.* Values are expressed as mean ± SD (n = 3)

Extracts	Phenolics content (mg GAE/g DW)	Flavonoids content (mg CE/g DW)	Tannins content (mg CE/g DW)
Hexane	39.91 ± 9.36	8.19 ± 0.16	14.05 ± 0.3
Ethyl acetate	53.07 ± 0.47	10.32 ± 0.12	14.51 ± 0.13
Butanol	41.66 ± 2.23	11.21 ± 0.10	13.93 ± 93
Ethanol	54.54 ± 1.26	12.00 ± 0.83	10.99
Aqueous	49.49 ± 0.39	9.49 ± 0.39	4.38 ± 0.45

Table 3: Quantification of total phenolic, flavonoids, and tannins contents of *Cynara scolymus* leaves extracts. Values are expressed as mean ± SD (n = 3).

Elements	*Cynara scolymus* leaves (mg/100 g of dry weight basis)
K	2886.803 ± 12.0
Ca	1359.346 ± 5.05
Na	1762.946 ± 12.0
Mg	433.219 ± 23.4
I	16.176 ± 0.14
Mn	13.051 ± 0.11
Zn	7.371 ± 0.14
Copper	1.30 ± 0.16
Cr	0.124 ± 0.01

Table 4: Mineral contents dried leaves of Cynara scolymus. Values are expressed as mean ± SD (n = 3).

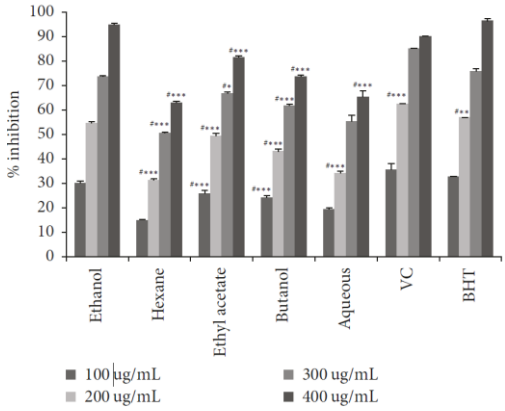


Figure 1: Antioxidant activity by DPPHmethod of *Cynara scolymus* leaves extracts at different concentrations. Values are mean ± SD (n = 3). $*p$ < 0.05, $**p$ < 0.01, and $***p$ < 0.001; #compared to EtOH extract. Butylated Hydroxytoluene (BHT). Vitamin C (VC).

Oliveira et al., in a 2014 study [9] , evaluated the antioxidant capacity of the aqueous extract of the leaves of Cynara scolymus on Saccharomyces cerevisiae strains, proficient and deficient in antioxidant defenses, and by in vitro methods with 1,1-diphenyl-2-picrylhydrazyl (DPPH•), 2,2'-azinobis-3-ethylbenzothiazoline-6- sulfonic acid (ABTS•+), inhibition of hydrogen peroxide, lipid peroxidation, formation of nitric oxide, and removal of the hydroxyl radical after the detection in the **aqueous extract** of phenolics, flavonoids and hydrolysable tannin.

THE ANALYSIS OF THE CORRELATION MADE BETWEEN THE CONTENT OF PHENOLIC COMPOUNDS AND THE DIFFERENT ANTIOXIDANTS IN VITRO METHODS, INDICATED THAT THESE COMPOUNDS ARE MAINLY RESPONSIBLE FOR THE ANTIOXIDANT CAPACITY OF THE AQUEOUS EXTRACT OF C. SCOLYMUS.

In a 2017 study[10], *Marques et al* characterized different *Cynara Scolymus* (CS) extracts in order to investigate the **antioxidant** and the **sun protection potential** in topical formulations. **Aqueous extracts** were analyzed by HPLC to quantify target compounds, such as cynarin, chlorogenic acid and cynaroside. Antioxidant activity by DPPH assay and ROS scavenging activity in HaCaT cells, as well as cytotoxicity assays and sun protection factor were assessed. The results showed that CS extract and CSC fraction (extract without acetic acid), one of the purified fractions, were rich in polyphenols and presented **antioxidant and photoprotective activity**. Then, both fractions were incorporated in two topical formulations: O/W emulsion and hydrogel. Physicochemical characterization, microbiological control, cytotoxicity assays and ROS scavenging activity in HaCaT cells were performed to ensure the quality, safety and efficacy of the products developed.

In vivo studies, Human Repeat Insult Patch Testing and an assay to determine their antioxidant capacity, were also performed. **Besides the excellent antioxidant and photoprotective activity, the final formulations proved to be also, suitable and safe for topical use.**

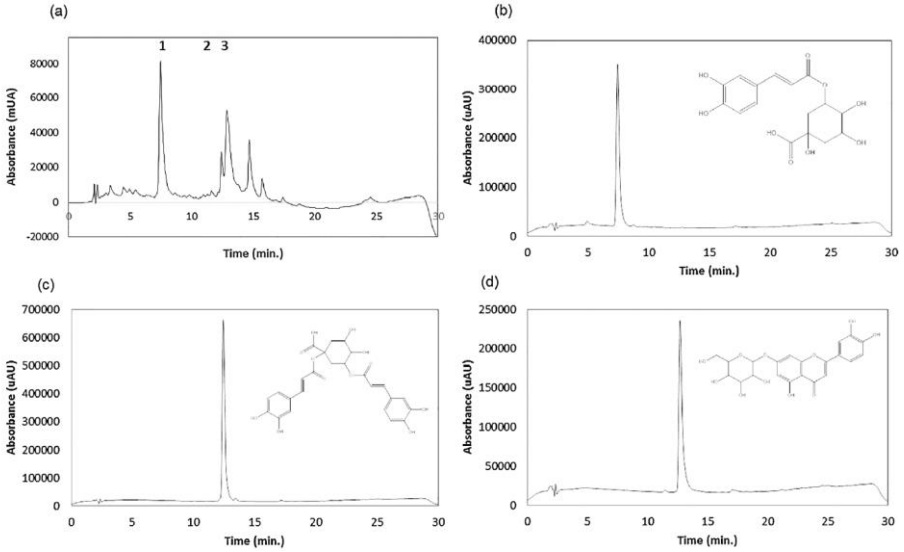


Fig. 2. HPLC-DAD chromatogram of artichoke and standards corresponding to the identified compounds: (a) C. scolymus infusion, 1-chlorogenic acid, 2-cynarin, 3-cynaroside; (b) chlorogenic acid; (c) cynarin; (d) cynaroside.

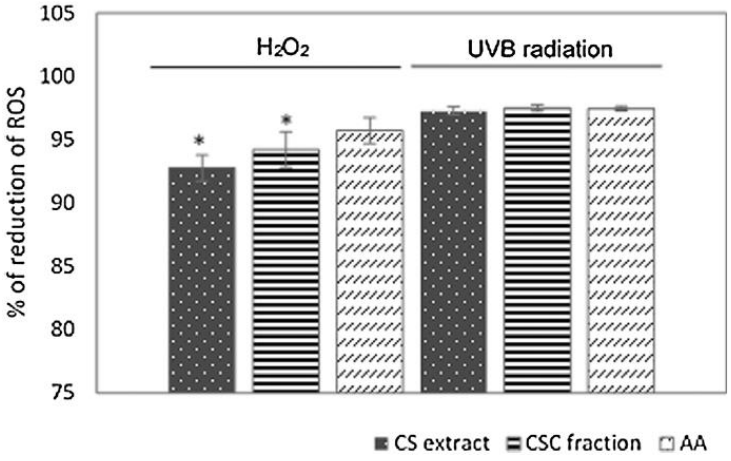


Fig. 3. ROS production of CS extract and CSC fraction in HaCaT cells in presence of H2O2 and when the cells are exposed to UVB radiation for 15 min. Ascorbic acid (AA) was used as a negative control. The concentration used for all samples was 1 mg/mL. The data are presented as the mean ± SD of at least 5 replicates experiments. Significance: (*) $p < 0.05$ versus negative control cells.

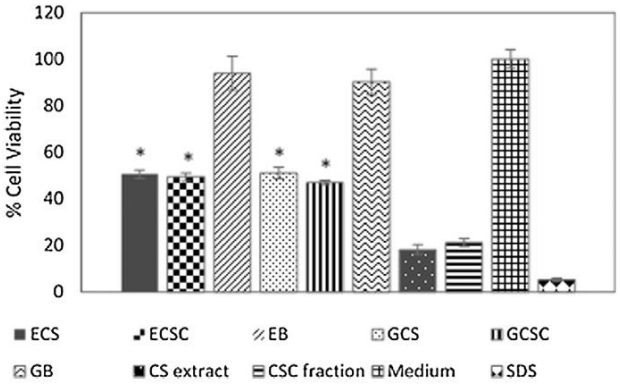


Fig. 4. MTT assay measurement of cytotoxicity of CS extract, CSC fraction and their respective topical formulations. The concentration used for all samples was 1 mg/mL. The data are presented as the mean ± SD of 6 replicates experiments. Significance: (*) $p < 0.05$ versus cells with blank formulations (EB and GB). ECS – emulsion with CS extract; ECSC – emulsion with CSC fraction; EB – blank emulsion; GCS – gel with CS extract; GCSC – gel with CSC fraction; GB – blank gel.

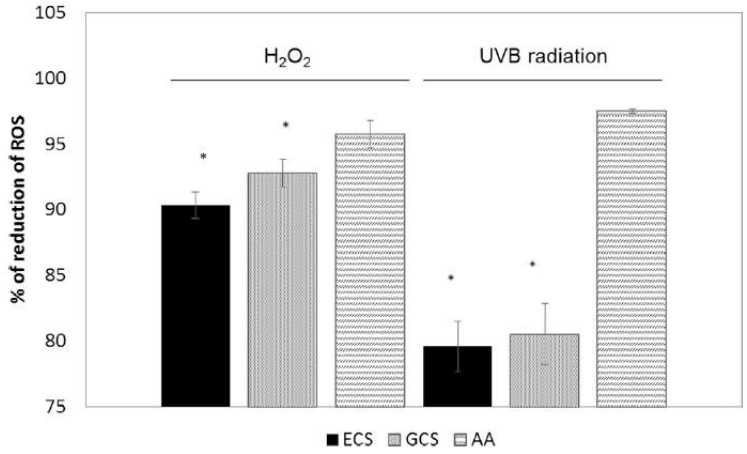


Fig. 5. ROS production of CS emulsion and CS gel in HaCaT cells in presence of H2O2 and when the cells are exposed to UVB radiation for 15 min. The concentration of CS extract or CSC fraction incorporated in the formulations in each cell of the microplate was 1 mg/mL. Ascorbic acid (AA) was used as a negative control. The data are presented as the mean ± SD of at least 5 replicates. Significance: (*) $p < 0.05$ versus negative control cells (ascorbic acid). ECS – emulsion with CS extract; CS – gel with CS extract; AA – ascorbic acid.

The CS extract alone has a higher percentage of ROS reduction when compared with the CS extract incorporated in a topical formulation probably due to the availability of the CS extract. The aqueous CS extract allows the direct contact with the cells, resulting in an immediate antiradical action. On the other hand, the complex matrix of the topical formulations, emulsion and gel, is able to retain the bioactive compounds present in the CS extract, releasing it slowly to the culturemedium. Thus, the action of CS extract has a less immediate impact due to a more extended response.

Human repeat insult patch testing (HRIPT): No evidence for the induction of allergic contact hypersensitivity was observed during the HRIPT assay, neither in the induction nor in the challenge period. The formulations showed very good skin compatibility and did not exhibit allergenic potential, which makes them skin-friendly and dermatologically safe products.

Assessment of the protective effect against oxidative stress after UV radiation by chromameter evaluation To evaluate the in vivo antioxidant activity, a relative analysis regarding the first day of topical application of the products (D0) was performed. Concerning the antioxidant capacity, the ECS and GCS presented a 75.8% and 87.0% decrease in the oxidant activity of the UVA radiation, respectively ($p < 0.05$). Finally, ECS and GCS proved to be an effective scavenger of reactive oxygen species in vivo.

In an interesting 2024 study, Roveda et al. [11] aimed to investigate the antiaging, antioxidant and anti-inflammatory effect of the topical application of a standardized artichoke leaf extract

These putative mechanisms of action were tested on 22 human volunteers.

Test: single center, randomized (computer generated 1:1 balanced randomization), split-face, double blind, placebo-controlled trial

Panel: healthy female subjects aged between 40 and 65 years old showing both chrono- or photo-aging with dull skin and an outdoor career, i.e. workers spending from 4 to 8 h of their workday doing tasks outside (e.g., traffic warden, warehousers, etc.).

Duration: 28 days (one complete stratum corneum turnover time)

Detections: T0 and after 28 days

		Active	Placebo	Units
Sex				
	Male	0% (0)	0% (0)	% (no.)
	Female	100% (22)	100% (22)	% (no.)
Age		53.3 ± 1.4	53.3 ± 1.4	Years
Skin type				
	Normal	31.8% (7)	31.8% (7)	% (no.)
	Mixed/Oily	27.3% (6)	27.3% (6)	% (no.)
	Dry	40.9% (9)	40.9% (9)	% (no.)
Wrinkle depth		260.9 ± 13.9	252.4 ± 15.3	µm
Skin roughness		33.5 ± 1.7	32.7 ± 1.2	µm
8° gloss (skin radiance)		12.0 ± 0.6	12.7 ± 0.7	a.u.
FRAP (antioxidant capacity)		44.6 ± 2.0	46.7 ± 2.9	µmol Fe^{II}
TNF-α		11.7 ± 0.8	11.6 ± 0.6	pg/mL

Table 5: Baseline and demographic characteristics. Data are means ± SE. a.u.: arbitrary units.

Parameters - Skin profilation: Wrinkle depth - Biological age – Skin roughness

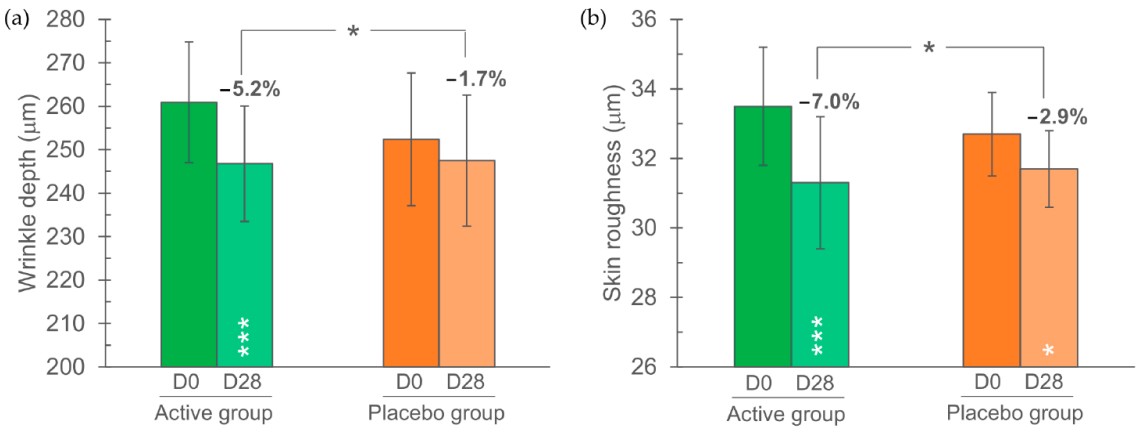


Fig.6: Skin profilometry. **(a)** Wrinkle depth. **(b)** Skin roughness.

The skin roughness in the active-treated side statistically significantly ($p < 0.001$) decreased by 7.0% (31.3 ± 1.9 µm at D28 vs. 33.5 ± 1.7 µm at D0).

A small, statistically significant ($p < 0.05$) decrease (−2.9%) was also observed in the placebo-treated side (Figure 2b).

Differences between the variation in both the wrinkle depth and the skin roughness in the active side were statistically significant ($p < 0.05$) compared to the placebo-treated side.

SKIN RADIANCE

Radiance (8° Gloss)	Active	Placebo
D0	12.0 ± 0.6	12.7 ± 0.7
D28	13.8 ± 0.4 *** (+19.0%) ‡	13.9 ± 0.5 ** (+14.0%)

Fig 7: skin radiance (8° gloss) in the active-treated side is statistically significantly ($p<0.001$) increased by 19.0 %. A statistically significant ($p<0.01$) increase of 14.0 % in the placebo treated side vs baseline. The difference between skin radiance in the active side were statistically significant ($p<0.05$) compared to the placebo treated side.

Antioxidant power (via FRAP= Ferric Reducing Antioxidant Power) and **skin inflammation** (via TNF-α dosage)

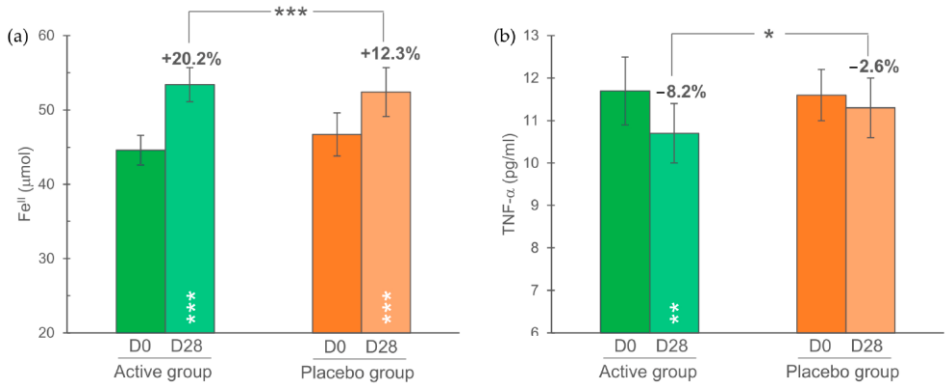


Fig. 8: (a) The daily use of the active product increased ($p<0.001$) the skin antioxidant capacity by 20.2%. A similarly significant ($p<0.001$) od 12.3 % was seen in the placebo treated side. **(b)** Skin inflammation decreased ($p < 0.01$) in the active-treated side by 8.2%(10.7 ± 0.7 pg/mL at D28 vs. 11.7 ± 0.8 pg/mL at D0). The variation in the placebo-treated side (−2.6%) was not statistically significant ($p > 0.05$). The difference between the active- and placebo-treated side (Figure Yb) was statistically significant ($p < 0.05$).

SKIN TOLERABILITY

Both the active and the placebo were well tolerated. No physical (erythema, edema, desquamation, dryness, others)

SELF-ASSESSMENT QUESTIONNAIRE

The self-assessment questionnaire was completed, independently, by the panelists at the end of the study (D28). The questionnaire output (Fig. Z) was most favorable for the active group. In the active group, the % of subjects who gave positive answers to all items was higher then 75%.

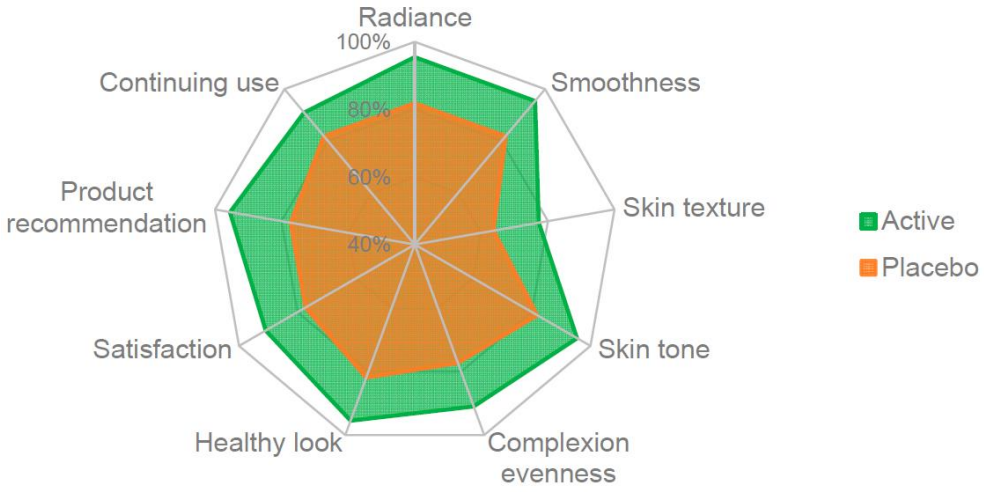


Fig. 9: Self-assessment questionnaire results.

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