

ORIGINAL ARTICLE

Unlocking the psycho-social-dermal axis: A double blinded randomized placebo controlled study unveiling the influence of a novel topical formulation on skin quality, attractiveness, quality of life, and sexual satisfaction

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Abstract

Background: Improved skin appearance is closely linked to higher self-esteem, favorable first impressions, and enhanced quality of life, with skincare products often being formulated with biostimulatory and regenerative ingredients to both enhance skin health and provide psychological benefits. Certain components, such as phospholipids and botanicals, may not only improve skin quality, but also impact mood, romantic bonding, and sexual attraction.

Aims: To assess whether a novel topical skin care product formulated with a proprietary combination of proteins, lipids, and botanical derivatives, can potentially result in a robust psycho-social-dermatological benefit via modulation epidermal oxytocin and pheromonal pathways.

Patients/Methods: In this single-center prospective, randomized, controlled, double-blinded study, 40 female subjects were randomly assigned to use of either active novel skincare products, or placebos, for 4–8 weeks. Skin assessments, standardized photography, first impression ratings, and questionnaires on confidence and sexual satisfaction were conducted.

Results: Thirty-nine subjects completed the study and demonstrated a statistically significant improvement in skin quality following 4 and 8 weeks of use, with improvements of greater magnitude demonstrated with a longer duration of use. Product users projected a better first impression and appeared on average 3 years younger than their actual age, with 86% of subjects reporting increased confidence. Product users found random people of the opposite sex to be more attractive 88% of the time and reported improvement in sexual satisfaction in 90% of the categories.

Conclusions: The use of this novel topical product culminated in statistically significant improvements in skin quality, confidence, sexual relationship satisfaction, perceived attractiveness, and youthfulness, highlighting its potential in anti-aging and mood enhancement.

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KEYWORDS

anti-aging, attractiveness, oxytocin, relationships, skincare

1 | INTRODUCTION

Skin aging is an ongoing process that is far from uniform and influenced by a complex interplay of variables such as sun exposure, tobacco use, skin phototype, as well as genetics.^{1–3} Ongoing research continues to elucidate novel intrinsic mediators of skin aging with the goal of broadening the scope of anti-aging interventions within the field of esthetic medicine. Popular cosmeceuticals often combine various epidermal and dermal regenerative stimulators with a direct aim to improve skin quality. A commonly denoted, yet under-emphasized, secondary effect of skincare is the psychological benefit patients report gaining from their improved appearance.⁴ Positive patient outcomes represent the ultimate goals of any cosmetic treatment, and the logical deduction has been that satisfied cosmetic patients experience increased self-esteem and quality of life in response to their improved appearance.

There exist unique bioactive botanicals originating from jasmine flowers^{5,6} and carob trees^{7,8} that have long been favored by native populations for not only their health and skin wellness benefits but also for mood enhancement and aphrodisiac properties, exerting their influence via oxytocin and pheromonic pathways. Oxytocin plays a pivotal role in numerous physiological and psychological processes including parturition, lactation, memory, and sexual performance.^{9–13} Beyond its physiological functions, oxytocin influences diverse facets of human behavior, and thus social interactions, fostering pair bonding, increasing trust, attraction, and alleviating stress.^{14,15} Oxytocin, while primarily released from the hypothalamus, is additionally synthesized and released from epidermal keratinocytes.^{16,17} This has led to an interest in the neuropeptide's potential role in skin function and appearance.¹⁸ Several natural botanicals have shown promise in reducing skin inflammation, improving dermal hydration, slowing aging, and potentially exerting oxytocin-like effects to enhance mood, self-esteem, and quality of life.^{19–22} In addition, volatile fatty acids derived from carob tree fruit contribute to a unique aroma that may have an effect similar to copulins secreted from female genitalia when signaling reproductive receptivity.²³ Additional phospholipid agents and peptides are a well-established component of many skin care products, preferred for their cellular protective, skin barrier function, and anti-inflammatory benefits.^{24,25}

Therefore, in the present study, the authors aim to evaluate the effects of a novel topical skin care regimen formulated with a proprietary combination of botanical active ingredients, phospholipids, and peptides. The intent is to design a tripartite and synergistic approach to improving skin appearance, mood and romantic bonding through epidermal, oxytocin and pheromonal pathways.

2 | MATERIALS AND METHODS

2.1 | Study Design

The present study represents a prospective, single-center, double-blinded, institutional review board-approved clinical trial. The inclusion criteria comprised female subjects aged 18–55, of all Fitzpatrick skin phototypes, and a willingness to avoid periods of extended sun exposure or tanning bed use for the duration of the trial. Exclusion criteria included poorly controlled medical and mood disorders, excessive allergenicity, atopic diseases, moderate to severe rosacea, active acne, excessive facial scarring, observable suntan or sunburn, scars, nevi, excessive facial hair, dermatologic conditions of the face that might affect study results, recent use of retinoids or hydroquinone, recent facial esthetic procedures, pregnancy, breastfeeding, and low sexual activity. Subjects were randomized into two groups: the first group (OX), consisting of 30 subjects, would receive the active OX cleanser, OX serum, and OX moisturizer to use twice daily as directed, while the second group, consisting of the remaining 10 subjects, would receive a placebo cleanser, serum, and moisturizer. The study was conducted in two parts: the initial double-blinded trial portion was conducted over a period of 4 weeks. Then, at the 4-week mark, subjects were unblinded and given the option to complete an additional open label trial with the active OX products for an additional 4 weeks, regardless of initial group assignment.

2.2 | Evaluation Parameters

Standardized photographs were taken at all visits. At the initial visit, two validated questionnaires were completed by the study subjects; these included the New Sexual Satisfaction Scale²⁶ (NSSS; [Supporting information S1](#)) and Couples Satisfaction Index²⁷ (CSI; [Supporting information S2](#)). A blinded esthetic physician performed a live assessment of skin quality through the evaluation of eight parameters ([Supporting information S3](#)) and three blinded medical reviewers conducted photography assessments of skin quality through the evaluation of four parameters ([Table 2](#)). Subjects were also presented with a panel of 10 model photographs and were asked to rate their attractiveness and trustworthiness on a visual analog scale ([Supporting information S4](#)). At the 2-week visit, the above assessments were repeated, along with the FACE-Q²⁸ ([Supporting information S5](#)) and Tolerability assessment ([Supporting information S6](#)). The FACE-Q assessed participants on their confidence levels in various social scenarios. The tolerability assessment evaluated for burning, stinging, tingling, or itching associated with product

use. At the 8-week visit, all above assessments were once again repeated, and patients completed a poststudy satisfaction survey (Supporting information S7) which queried patients on six parameters, which included: (1) whether they liked the product, (2) if they would recommend it to a friend, (3) if it made them feel more confident in their skin, (4) if it improved their skin tone evenness, (5) skin youthfulness, and/or (6) skin radiance. Finally, 239 blinded evaluators completed the First Impression Questionnaire,^{29,30} (Supporting information S8) a previously published survey evaluating social skills, academic performance, dating success, occupational success, attractiveness, financial success, relationship success, athletic success, and perceived age. In total, 2151 first impressions were recorded for each of the nine subscales, yielding 19 359 individual assessments of first impressions.

2.3 | Statistical Analyses

Statistical analyses, including paired *t*-tests for primary endpoints (NSS, CSI, Face-Q social survey), and Wilcoxon Signed-Rank/Mann-Whitney *U* tests for secondary endpoints (skin quality, attractiveness, trustworthiness, first impressions), were conducted using MATLAB and Excel. In all cases, *p*-values <0.05 taken to represent statistical significance. Additional details concerning the methods can be consulted in Appendix S1.

3 | RESULTS

In the present prospective, double-blinded, randomized, and controlled clinical trial, the authors evaluated a novel skin care product, OX, formulated with proprietary botanical active ingredients with oxytocin and pheromone-like effects. The findings demonstrated statistically significant improvements in skin quality, confidence, romantic relationship satisfaction, quality of life, perceived

attractiveness, and youthfulness among study subjects, with a summary of findings presented in Figures 1–6.

3.1 | Subject demographics

Forty female subjects were enrolled, with 39 females completing the study with a mean age of 35.7 years (range: 18–55). Through the process of randomization, 30 subjects were assigned to the OX cohort, while the remaining 10 patients were placed in the placebo group. Three subjects did not complete the study. This included two subjects from within the OX cohort, for whom the reason for exclusion was unexpected pregnancies at 13 and 16 weeks of gestation, respectively. One other dropped out for reasons unrelated to the study. Two subjects were replaced with two new randomized enrollees, culminating in a total of 39 subjects completing the study.

3.2 | Skin Quality Assessment

A blinded esthetic physician performed live assessments of skin quality at study baseline (week 0), and subsequently at weeks 2, 4 and 8 (Table 1, Figure 1). In the OX group, significant improvements (*p* < 0.001) were observed across all categories except “wrinkles” from baseline to week 4, and from baseline to week 8, with the greatest significance seen in improvement of “evenness,” “smoothness,” “radiance,” “dewiness,” and “dryness” (*p* < 0.0001). When examining for changes in the OX group between weeks 4 and 8, only dewiness showed significant improvement (*p* < 0.03). This indicates that 4 weeks of treatment is largely sufficient for the demonstrated beneficial effects of the treatment within this cohort. Conversely, in the placebo group, no significant differences were observed in any of the eight parameters from baseline to week 4, or from baseline to week 8.

When comparing the improvements within the OX and placebo groups directly and against each other, at different time points within

SKIN QUALITY INVESTIGATOR-REPORTED	
OX users vs. Placebo at 4 weeks	OX users x 8 weeks vs. OX x 4 weeks
Improved Evenness (<i>p</i> < 0.0001)*	Improved Evenness (<i>p</i> < 0.007)*
Improved Smoothness (<i>p</i> < 0.0001)*	Improved Radiance (<i>p</i> < 0.03)*
Improved Radiance (<i>p</i> < 0.0001)*	Improved Dewiness (<i>p</i> < 0.0005)*
Improved Dewiness (<i>p</i> < 0.0001)*	Reduced Redness (<i>p</i> < 0.005)*
Reduced Redness (<i>p</i> < 0.007)*	
Reduced Dryness (<i>p</i> < 0.005)*	

FIGURE 1 Improved Investigator-Reported Skin Quality in OX Users: Significant improvements were observed from baseline to week 4, and from baseline to week 8, with the greatest significance seen for “evenness,” “smoothness,” “radiance,” “dewiness,” and “dryness.” When examining scores for both groups, from study baseline to week 8 (wherein the OX group incurred 8 weeks of treatment, compared to the 4 weeks of treatment in the cross-over placebo group), a significant difference was observed in all 4 categories between the OX and placebo groups. Values with a “*” demonstrate statistical significance (*p* < 0.05).

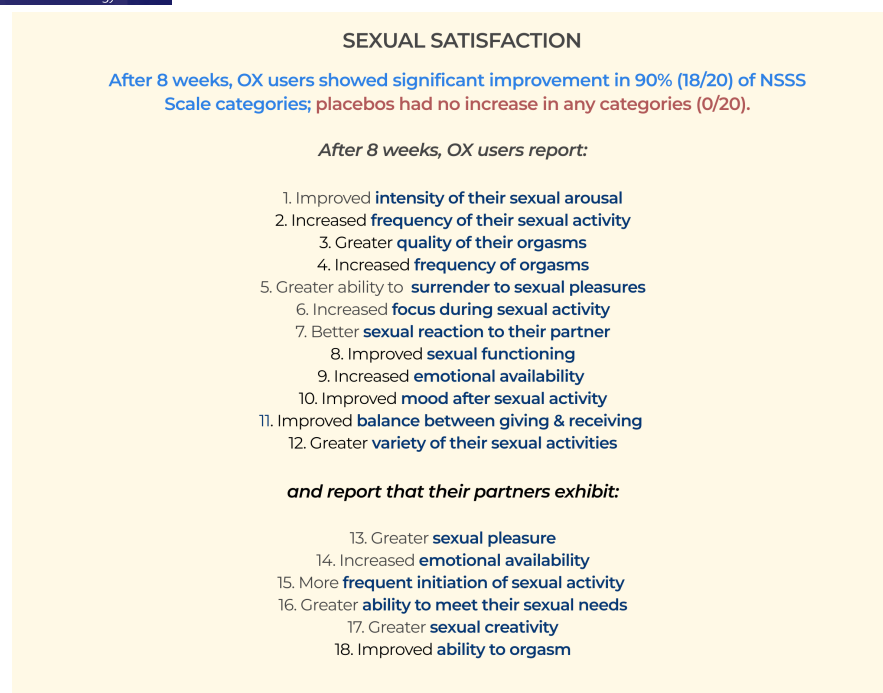


FIGURE 2 Improved Sexual and Relationship Satisfaction in OX Users: Significant improvements in intensity, quality, and frequency of sexual activity were reported in OX users. When comparing scores within the OX group, between baseline and 4 weeks of treatment, significant improvements were observed in 4/20 assessment categories examined (20%), whereas 18/20 (90%) significantly improved following 8 weeks. In contrast, in the placebo group, no significant differences (0/20) were observed.

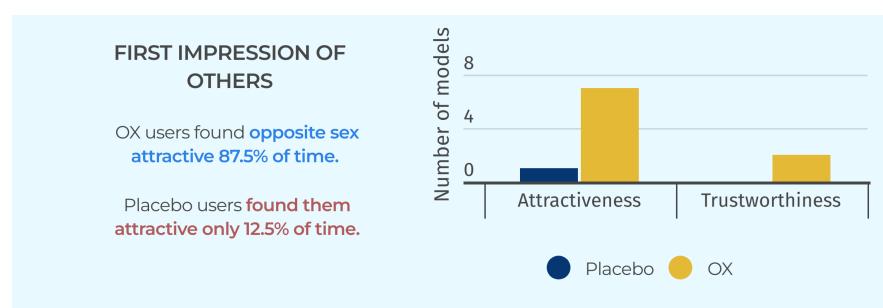


FIGURE 3 Improved First Impressions of Others from the Point of View of OX Users: In the OX group, 87.5% (7/8) of male model photos were rated as significantly more attractive at both week 4, and at week 8, when compared to baseline. In contrast, in the placebo group, 12.5% (1/8) of male model photos were rated to be more attractive as compared to baseline rating. The OX group rated 37.5% (3/8) of male photos as significantly more trustworthy at 4 weeks. In the placebo group no (0/8) models were rated as more trustworthy relative to baseline.

the study (weeks 0–4, and weeks 4–8), scores for 6/8 parameters were demonstrated to be significantly improved in the OX group in the first half of the study (p -value ranges between <0.01 and <0.0001), with the greatest significance once again demonstrated for “evenness,” “smoothness,” “radiance,” “dewiness,” and dryness ($p < 0.0001$). No significant differences were observed for the presence of “photodamage” or “wrinkles.” When both groups were evaluated and compared between 4 and 8 weeks, at which point the placebo group crossed over and applied the OX product for 1 month, no significant difference were observed between both groups.

Additional analyses were conducted specifically on parameters for which the OX product appeared to have the most significant

effect, including “evenness,” “smoothness,” “radiance,” and “dewiness” (Table 2). Photograph assessments were performed by three blinded esthetic medical reviewers. When examining scores for both groups, from study baseline to week 8 (wherein the OX group incurred 8 weeks of treatment with the OX product, compared to the 4 weeks of treatment in the cross-over placebo group), a significant difference was observed in all four categories between the OX and placebo groups (p -value range: 0.0005–0.03). This demonstrates that while both groups demonstrated significant improvements with a minimum of 4 weeks of treatment, the OX group, with longer use of the active product, also improved to a significantly greater extent than the placebo group in these specific parameters examined.

FIGURE 4 Improved First Impressions of OX Users: When blinded raters were asked to evaluate the photographs of both groups, a majority of OX users were judged to make a better first impression in all categories with statistically significant higher scores for perceived social skills, attractiveness, and occupational, financial and relationship success. Whereas for the placebo group there was no improvement (0/9) in any categories. Values with a “**” demonstrate statistical significance ($p < 0.05$).

FIRST IMPRESSION OF OX USERS

239 blinded evaluators judged a majority of OX users to make a better first impression in all categories as compared to placebos, reaching statistical significance in 5/8 of the categories

1. Social Skills*
2. Occupational Success*
3. Attractiveness*
4. Financial Success*
5. Relationship Success*
6. Athletic Success
7. Academic Performance
8. Dating Success

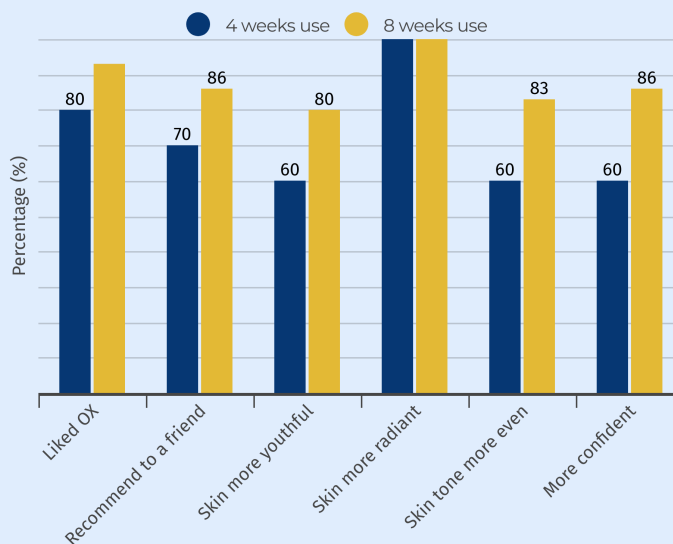
On average subjects were judged to be 3 years younger than their actual age

FIGURE 5 Improved Subject-Reported Skin Quality in OX Users: Of those in the OX group who had used the product for 8 consecutive weeks, 93% liked the product, 86% felt more confident and would recommend the product to a friend, 83% saw improvements in their skin tone, and 80% felt that they appeared more youthful. The additional 4 weeks of product use led to significantly increased scores for skin youthfulness and improvement of skin tone evenness. Values with a “**” demonstrate statistical significance ($p < 0.05$).

SKIN QUALITY SUBJECT-REPORTED

"Improved evenness in my skin tone" ($p < 0.047$)*

"My skin looks more youthful" ($p < 0.03$)*



3.3 | Sexual and Relationship Satisfaction

Subjects were asked to complete two questionnaires in order to assess the evolution of their sexual and relationship satisfaction over the course of the study. The first was the validated New Sexual Satisfaction Scale (NSSS),²⁶ which poses twenty questions concerning quality, intensity, frequency, and associated mood surrounding arousal, orgasm, and sexual activity, regardless of gender, sexual orientation, and relationship status. When comparing scores within the OX group, between baseline and 4 weeks of treatment, significant improvements were observed in 4/20 assessment categories examined (20%), whereas 18/20 (90%) significantly improved following 8 weeks (p -value range 0.0004 to 0.04). In contrast, in the placebo group, no significant differences (0/20) were observed (Table 3, Figure 2).

The second standardized questionnaire, the Couple Satisfaction Index, which assesses various aspects of relationship satisfaction demonstrated no significant differences in scores between either of the two groups at the different time points within the study.

3.4 | Attractiveness and Trustworthiness

Study subjects were asked to perform a visual assessment of models in order to evaluate the evolution of their perception of others' attractiveness and trustworthiness over the course of the study. Subjects were presented with a photo panel of the same 10 model photographs at each visit, consisting of 8 males and 2 females, and were asked to rate their attractiveness and

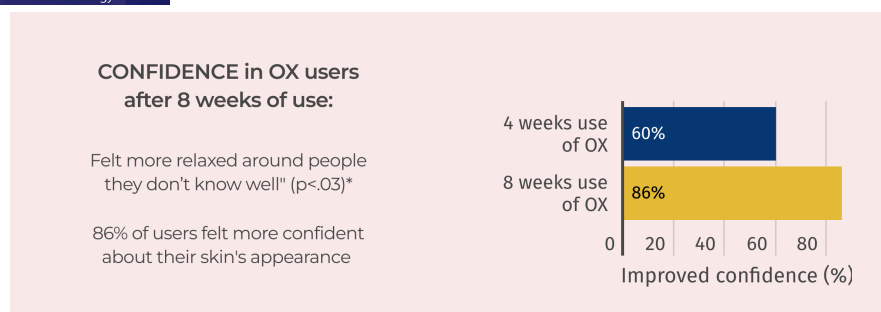


FIGURE 6 Improved Confidence in OX Users: Of those in the OX group who had used the product for 4 consecutive weeks, 60% felt more confident, while after 8 weeks of use, an even greater proportion of subjects felt they appeared more confident, at 86%. When scores were examined between weeks 2 and 8, OX users reported feeling increasingly “relaxed around people that [they] don't know well.” Values with a “*” demonstrate statistical significance ($p < 0.05$).

TABLE 1 Assessment of skin quality.

Investigator Assessment	V1-V4 Active	V1-V3 Active	V1-V3 Placebo	V1-V3 AvsP	V3-V4 Placebo -> Active	V3-V4 Active	V3-V4 AvsP
Evenness	<0.0001*	<0.0001*	0.1250	0.0001*	0.1250	0.1797	0.3413
Smoothness	<0.0001*	<0.0001*	0.2500	<0.0001*	0.0625	0.1094	0.4065
Overall photodamage	0.0002*	0.0039*	1.000	0.0679	1.000	1.000	0.8676
Radiance	<0.0001*	<0.0001*	0.500	<0.0001*	0.250	0.0625	0.2522
Dewiness	<0.0001*	<0.0001*	0.1250	0.0001*	0.500	0.0312*	0.5104
Wrinkles	0.3125	0.5312	1.000	0.7390	1.000	1.000	0.8761
Redness	0.0007*	0.0110*	1.000	0.0068*	0.1250	0.1163	0.1375
Dryness	<0.0001*	0.005*	1.0000	0.0045*	1.000	0.5625	0.6008

Note: Skin quality of enrolled subjects was assessed at weeks 0, 2, 4 and 8 through the evaluation of eight parameters including: skin tone evenness, smoothness, overall photodamage, radiance, dewiness, wrinkles, redness and finally, dryness. Evaluation performed by three medical reviewers. Values with an asteric demonstrate significance ($p < 0.05$).

Category	Active V1-V4	Placebo V1-V3	V3-V4 Placebo -> Active	AvsP V1-V4
Evenness	0.0153*	0.9297	0.0054*	0.0072*
Radiance	0.00001*	0.4014	0.0081*	0.0324*
Dewiness	0.00001*	0.5422	0.0029*	0.0005
Erythema	0.0017*	0.0742	0.0065	0.0046*

Note: Statistical analyses were performed to further evaluate the four most highly significant parameters as established from the initial analysis in Table 1, which included skin tone evenness, radiance, dewiness and erythema. Evaluation performed by three medical reviewers. Values with an asteric demonstrate significance ($p < 0.05$).

TABLE 2 Assessment of skin evenness, radiance, dewiness, and erythema.

trustworthiness on a visual analog scale. In the OX group, 87.5% (7/8) male model photo were rated as significantly more attractive at both week 4, and at week 8, when compared to baseline. In contrast, the placebo group 12.5% (1/8) male model photos were rated to be more attractive as compared to baseline rating. The OX group rated 37.5% (3/8) male photos as significantly more trustworthy at 4 weeks. In the placebo group no (0/8) models were rated as more trustworthy at 4 weeks relative to baseline. Neither of the female model photos (0/2) were rated more attractive or trustworthy at either the 4- or 8-week timepoint by either group (Table 4, Figure 3).

3.5 | FACE-Q Social Function

Study subjects were asked to fill out the validated FACE-Q Social Function Scale in order to assess patient-reported treatment outcomes in a standardized and validated fashion. In the OX group, a significant improvement was demonstrated between weeks 2 and 8 ($p=0.04$), with subjects feeling increasingly “relaxed around people that [they] don't know well.” Other evaluated parameters remained relatively stable throughout the study, with no statistically significant differences observed in either groups, when compared against themselves at different timepoints within the study, or against each other (Table 5).

TABLE 3 New Sexual Satisfaction Scale scores.

NSSS Question	V1-V4 Active	V1-V3 Active	V1-V3 Placebo	V1-V3 AvsP	V3-V4 Placebo -> Active	V3-V4 Active	V3-V4 AvsP
1. The intensity of my sexual arousal.	0.0287*	0.2407	0.1875	0.3767	0.625	0.2734	0.3347
2. The quality of my orgasms.	0.00831*	0.1447	0.3750	0.2027	1.000	0.0918	0.0999
3. My "letting go" and surrender to sexual pleasure during sex.	0.0006103*	0.0137*	1.000	0.0806	0.5312	0.0332*	0.0861
4. My focus/concentration during sexual activity.	0.00317*	0.0106*	1.000	0.0645	0.3750	0.2266	0.4612
5. The way I sexually react to my partner.	0.000855*	0.0065*	1.000	0.0624	1.000	0.4602	0.4096
6. My body's sexual functioning	0.00549*	0.0647	0.2500	0.1095	1.000	0.6072	0.6462
7. My emotional opening up in sex.	0.00713*	0.0793	0.625	0.2309	1.000	0.0455*	0.132
8. My mood after sexual activity	0.0292*	0.3367	0.500	0.4593	1.000	0.2668	0.2734
9. The frequency of my orgasms.	0.00181*	0.4117	0.1875	0.45	1.000	0.0195*	0.0645
10. The pleasure I provide to my partner.	0.00259*	0.3149	1.000	0.4545	1.000	0.0107*	0.0444*
11. The balance between what I give and receive in sex.	0.0179*	0.9484	1.000	0.9576	0.6250	0.0009*	0.0089*
12. My partner's emotional opening up during sex.	0.0372*	0.8371	1.000	0.9714	0.5000	0.0963	0.1341
13. My partner's initiation of sexual activity.	0.0495	0.8469	1.000	0.7994	0.6875	0.0479*	0.0873
14. My partner's ability to orgasm.	0.0296*	0.4790	1.000	0.713	0.5000	0.0065*	0.0275
15. My partner's surrender to sexual pleasure ("letting go").	0.0684	1.000	1.000	0.8418	0.0625	0.0195*	0.0492*
16. The way my partner takes care of my sexual needs.	0.0120*	0.3469	1.000	0.4394	0.7500	0.0278*	0.1039
17. My partner's sexual creativity.	0.00858*	0.2854	0.3125	0.3373	1.000	0.0397*	0.0703
18. My partner's sexual availability.	0.180	0.1484	0.3750	0.3719	1.000	0.0018*	0.0454*
19. The variety of my sexual activities.	0.00281*	0.2103	1.000	0.3776	0.1250	0.0232*	0.0483*
20. The frequency of my sexual activity.	0.000451*	0.0232*	0.250	0.1051	0.5000	0.0195*	0.1087

Note: At the baseline, week 2, 4 and 8 visits, subjects were asked to fill the New Sexual Satisfaction Scale which poses twenty questions concerning quality, intensity, frequency, and associated mood surrounding arousal, orgasm, and sexual activity to assess sexual satisfaction regardless of gender, sexual orientation, and relationship status. Values with an asteric demonstrate significance ($p < 0.05$).

3.6 | Product Tolerability

Tolerability was demonstrated to be the same among both study groups (OX vs. placebo), with no significant differences observed in scores following either 4 or 8 weeks of treatment.

3.7 | First Impression Questionnaire

In the final phase of the study, 239 random reviewers, naïve to any interventions being done, assessed first impression, attractiveness, and perceived age scores of each subject based on a comparison of their baseline, 4- and 8-week photographs in a blinded fashion. To avoid fatigue, the number of photos evaluated by each reviewer was limited and no reviewer saw the same person's baseline, week 4, and week 8 photo twice within one book. Within the OX group, a majority of subjects were judged as projecting an improved first impression in all categories with statistically significant improvements demonstrated in perceived age, social skills, attractiveness, as well as occupational, financial and relationship

success. And subjects who were over 30 years of age who had used the product for 8 weeks were judged by the reviewers to look an average of 3 years younger than their actual age. When evaluating the placebo group from baseline to 4 weeks, no (0) significant changes were observed in any category; however, when evaluating the placebo group following crossover between 4 and 8 weeks, first impressions scores were significantly increased in perceived social skills, academic performance, attractiveness, as well as dating and occupational success. Finally, at week 8, scores for the OX group and placebo group were within a similar range, suggesting that 4 weeks of treatment appears to be sufficient for these demonstrated benefits on emulated first impressions (Table 6, Figure 4).

3.8 | Poststudy Satisfaction

Of those in the OX group who had used the product for 8 consecutive weeks, 93%, liked the product and agreed that their skin looked more radiant, 86% felt more confident and would recommend the

TABLE 4 Assessment of Attractiveness and Trustworthiness.

Model	Measure	Active V1-V4	Active V1-V3	Placebo V1-V3	AvsP V1-V3	AvsP V3-V4
Model 1	Attractiveness	0.0061*	0.0076*	0.2500	0.0078*	0.8948
	Trustworthiness	0.0084*	0.0029*	0.5212	0.0170*	0.7706
Model 2	Attractiveness	0.0725	0.3420	0.1250	0.4356	0.7383
	Trustworthiness	0.1159	0.1734	1.000	0.3217	0.8885
Model 3	Attractiveness	0.1371	0.0616	0.5000	0.2567	0.9934
	Trustworthiness	0.8394	0.0780	0.4375	0.1530	0.3537
Model 4	Attractiveness	0.0339*	0.0433*	0.2891	0.0938	0.9675
	Trustworthiness	0.1034	0.7194	0.3125	0.7277	0.4367
Model 5	Attractiveness	0.0013*	0.0041*	0.5000	0.0224*	0.8470
	Trustworthiness	0.3070	0.2983	0.6406	0.5398	0.7746
Model 6	Attractiveness	0.0253*	0.0198	0.1484	0.0371*	0.8957
	Trustworthiness	0.6458	0.4999	0.8047	0.5968	0.9608
Model 7	Attractiveness	0.0009	0.0008*	0.1875	0.0017*	0.8397
	Trustworthiness	0.4195	0.0471*	0.3594	0.1601	0.7490
Model 8	Attractiveness	0.0652	0.2719	0.3750	0.4414	0.9343
	Trustworthiness	0.0729	0.2156	1.000	0.4519	0.7551
Model 9	Attractiveness	0.0364*	0.0047*	0.0156*	0.1180	0.8068
	Trustworthiness	0.0091*	0.0027	1.000	0.0217*	0.7444
Model 10	Attractiveness	0.0224*	0.0326*	1.000	0.1264	1.000
	Trustworthiness	0.3091	0.5904	0.5312	0.7559	0.7858

Note: Study participants were asked to perform a model assessment at baseline, weeks 2, 4 and 8, to assess the evolution of their perception of others' attractiveness and trustworthiness over the course of the study period. The subjects were presented with a panel of the same 10 model photographs at each visit, consisting of eight males and two females, and were asked to rate their Attractiveness and Trustworthiness on a visual analog scale (VAS) from 1 to 7. Values with an asteric demonstrate significance ($p < 0.05$).

product to a friend, 83% saw improvements in their skin tone evenness, and 80% felt that they appeared more youthful. Of those in the placebo group who had used the OX product for only 4 weeks, 100% agreed that it made their skin look more radiant, 80% liked the product, 70% would recommend it to a friend, and 60% saw improvement in their skin tone, felt they appeared more youthful, and felt more confident (Figure 5 and Figure 6). Overall, when comparing the OX and placebo groups, the additional 4 weeks of product use led to increased scores in all but one category, with significantly increased scores for skin youthfulness ($p < 0.03$) and improvement of skin tone evenness ($p < 0.05$, Table 7).

4 | DISCUSSION

The skin, through a phenomenon referred to as the "brain-skin connection" is intricately connected to our emotional state, exhibiting an immediate response to mental stress, often triggering inflammation and immune dysregulation as observed in different skin dyscrasias including rosacea, eczema, and psoriasis.^{31,32} Additionally, it is hypothesized that stress can accelerate skin aging, by hampering healing and repair processes.³¹ Practicing physicians, are acutely aware of the psycho-social impact of skin disease and esthetic care.

Therefore, to achieve optimal psycho-social-dermatological enhancement, we developed a unique tripartite approach, by combining a blend of ingredients containing phospholipids, jasmine flower extract, and carob derivatives to directly target the epidermis while also utilizing indirect paracrine and pheromonal pathways.

Phospholipids and peptides common to many skin care regimens are favored for their anti-aging, anti-inflammatory, keratinocyte-stimulating, cellular-protective, and skin barrier-function benefits. They directly influence collagen and elastin production as well as downregulate MMP-1 expression in the skin.^{24,25} Jasmine flower of the Oleaceae family, native to Asia with a spiritual, religious, and social significance is a decorative and adornment in many cultures.^{5,33} It is ubiquitously seen at festivals and events and commonly worn around the neck and within hair.^{5,33} It is best known for its pleasing aromas and is a frequent component in many perfumes, candles soaps, and lotions.^{5,33} In addition to its favorable odor, jasmine has a traditional role in Ayurvedic medicine, as its reported analgesic, anxiolytic, and dermatological properties make it a favorite in many essential oils and foot baths.^{5,33} A unique effect of jasmine, of particular interest, is its ability to increase skin oxytocin levels.⁶

Oxytocin, while primarily released from the hypothalamus, has recently been shown to be synthesized and released from keratinocytes in the epidermis.^{16,17} This is not surprising as it has been well

TABLE 5 FACE-Q Social Function assessment.

Question	Active V2-V4	Active V2-V3	Placebo V2-V3	AvsP V2-V3	AvsP V3-V4
I make a good first impression	0.2734	0.1094	0.250	0.3079	1.000
I feel confident when I meet a new person	0.0703	0.2188	1.000	0.4048	0.7332
I am comfortable meeting new people	0.1094	0.7539	1.000	0.7059	0.5138
It is easy for me to make friends	0.4316	1.000	1.000	0.9010	0.5227
I feel confident when I participate in group situations	0.7812	1.000	1.000	0.9931	0.8017
I feel confident in new social situations	0.3594	0.1250	1.000	0.4590	1.000
I am relaxed around people that I don't know well	0.0352*	0.0762	1.000	0.2506	0.9033
I feel confident when I walk into a room full of people I don't know	0.4240	0.1797	1.000	0.4938	0.8416

Note: At weeks 2, 4 and 8, all study participants were asked to fill out the validated FACE-Q, which were used to measure patient reported treatment outcomes in a standardized manner. The results from the "Social Function" scale within the "Quality of Life" assessment category are reported in the following table. Participants were queried with a consistent set of seven questions at each follow up visit regarding their confidence levels in various social scenarios which encompassed interactions such as meeting new individuals, making new friends, engaging in one-on-one encounters, participating in group settings, and navigating unfamiliar social situations. Values with an asteric demonstrate significance ($p < 0.05$).

TABLE 6 First Impression Questionnaire.

Question	Active V1-V4	Placebo V1-V3	V3-V4 Placebo -> Active	AvsP (see note)
Social skills	0.0097*	0.9375	0.0078*	0.1626
Academic performance	0.0725	0.8984	0.0078*	0.1828
Dating success	0.1080	0.7188	0.0078*	0.6051
Occupational success	0.0444*	0.8438	0.0234*	0.2095
Attractiveness	0.0016*	0.4531	0.0156*	0.0967
Financial success	0.0029*	0.4766	0.1719	0.0140*
Relationship success	0.0304*	0.4844	0.3673	0.0988
Athletic success	0.0520	0.7812	0.8906	0.2618
AGE	0.0013*	0.6406	0.1094	0.1240

Note: In the final phase of the study, an online survey program was used to collect first impression, attractiveness and perceived age scores of each subject based on their postintervention 8-week photographs. A panel of three random reviewers, with medical and skin care training, assessed each subject in a blinded fashion according to the First Impression Questionnaire. Ratings out of 10 were collected for the following eight parameters: social skills, academic performance, dating success, occupational success, attractiveness, financial success, relationship success and athletic success. Values with an asteric demonstrate significance ($p < 0.05$).

established that physical touch between a mother and her child as well as romantic partners will result in increased plasma oxytocin levels. In this context, elevated oxytocin has been found to not only be associated with improvement in mood, trust, and attractiveness, but also in that of the skin's appearance.^{34,35} This has led to an interest in exploring the neuropeptide's influence on skin appearance and

function.¹⁶ But how does a topical jasmine extract increase oxytocin levels? Likely it works via the mechano-sensory receptors known as Piezo1. For years the mechanical touch mechanism resulting in oxytocin release was unfounded. In 2021 the Nobel prize in physiology was awarded for discovery of the Piezo1 receptor channel.³⁶ The skin transmits the sensation of touch to sensory neurons through

Question	p-Value <0.05
Did you like the product	0.0811
Would you recommend it to a friend	0.0843
Improved evenness in skin tone	0.0467*
My skin makes me look more youthful	0.0295*
Made my skin look brighter and more radiant	0.0699
Made me feel more confident in the way my skin looks	0.0678

Note: At weeks 4 and 8, participants were invited to complete a poststudy satisfaction survey consisting of six questions regarding their perceived enhancements in skin quality, confidence, youthfulness, and overall enjoyment of the product. Each question was rated out of 5 points, with 1 point corresponding to "Agree," 2 points to "Somewhat agree," 3 points to "Neither agree or disagree," 4 points to "Somewhat disagree" and 5 points to "Disagree." Values with an asteric demonstrate significance ($p < 0.05$).

TABLE 7 Poststudy Satisfaction Assessment.

the Piezo1 mechanoreceptor found in the plasma membrane of epidermal keratinocytes and fibroblasts.^{37,38} Such mechanical forces have proven to be integral to the skin's wound healing process, modulating inflammation, tissue proliferation, and scar formation³⁹ as well increasing oxytocin levels.⁴⁰ A specific extract of jasmine applied topically favorably influences Piezo1 mechano-sensory receptors and results in oxytocin release in the skin.⁴¹

Further investigation reveals with the inhibition of Piezo1 receptors there is decreased levels of oxytocin seen in skin,³⁹ which has been shown to negatively affect skin age scores in female subjects.³⁵ Oxytocin, has been studied for its role in preventing intrinsic skin aging,⁴² and shown to suppress senescence in skin fibroblasts.⁴⁰ It is no surprise that oxytocin, and collaborative compounds that activate its receptors, may represent potential therapeutic targets for the prevention of skin aging.⁴⁰ It was presumed the jasmine extract, with a likely increase in skin oxytocin levels, would be additive to the phospholipids and peptides to amplify an improvement in the appearance of the skin. And indeed, the results of the present study demonstrate that following 8 weeks of OX product use, statistically significant improvements in both patient- and investigator-reported skin quality assessment outcomes are observed including improved evenness, radiance, dewiness, erythema, and dryness relative to controls. On average, subjects over 30 years of age who used the OX product for 8 weeks were also judged to look 3 years younger than their actual age. Benefits following 8 weeks of product use also surpassed those seen in patients in whom the products were only used for 4 weeks, indicating that limited OX use was sufficient for these demonstrated benefits and superior to placebo, but also that a longer duration of use yields greater benefits.

In addition to its skin enhancing benefits oxytocin has been hypothesized to promote prosocial behavior and enhance positive social perceptions of others, with studies demonstrating that unfamiliar faces were attributed higher ratings of "trustworthiness" and "attractiveness" by patients who were administered intranasal oxytocin, compared to controls who were not.^{34,43} Remarkably, oxytocin also appears to mask negative personality perceptions that masculinized faces tend to elicit, changing preferences from more feminine facial shapes to slightly more masculine ones, and underscoring its

multifaceted role in shaping human behavior and relationships.⁴⁴ While oxytocin studies are most commonly performed with intranasal administration,^{9,45,46} our topically formulated application after 8 weeks of use created corroborating results. In the present study, OX users were 87.5% (7/8) more likely to find random individuals of the opposite sex attractive, whereas the placebo group only found 12.5% (1/8) of random individuals more attractive.

There exists ample evidence suggesting that improved esthetic appearance culminates in improved self-esteem and an enhanced quality of life.^{21,22} Moreover, enhancing esthetic appearance correlates with improved first impressions and perceived attractiveness and success.^{42,47} The subjects in the OX cohort exhibited greater confidence improvement in their skin appearance. They reported a positive change in the way others perceived and treated them. But would this favourability rating translate through their photographs to random reviewers? When blinded raters were asked to evaluate the photographs of both groups, a majority of OX users were judged to make a better first impression with statistically significant higher scores for perceived social skills, attractiveness, and occupational, financial and relationship success. Whereas for the placebo group there was no improvement (0/9) in any categories.

The positive effects of oxytocin can improve sexual experiences by enhancing orgasms, increasing sexual satisfaction, promoting relaxation, and fostering empathy and pair bonding.⁴⁸ Tactile stimulation has been found to elevate plasma oxytocin levels, potentially enhancing fidelity in romantic partnerships.^{49,50} We next evaluated the effects the OX unique formula would have on romantic relationships sexual satisfaction using the validated (NSSS) as a measuring tool. Indeed, the results of the present study demonstrated statistically significant improvements in 90% (18/20) of the evaluated categories of sexual satisfaction in comparison to placebo, with improvement in their intensity, quality, and frequency of sexual activity, as well as the perceived pleasure they were able to provide to their partners. In contrast in the placebo group 0% (0/20) categories were improved. The strong positive effects, with 90% versus 0%, were surprising. Additionally, partners also reported higher sexual satisfaction. It seemed the results were more than what would be expected from a dermal

oxytocin effect alone. Perhaps, the meaningful results are in part due to the third aromatic pathway approach via a derivative ingredient from carob.

Carob an evergreen tree belonging to the legume family (Fabaceae) is common to Western Asia and the Mediterranean basin.⁸ Since antiquity carob has been celebrated for its medicinal benefits including a digestive aid, anxiolytic, anti-inflammatory, antidepressant, dermatologic, and aphrodisiac.⁸ While well designed clinical trial in humans exploring carob's sexually attracting properties are unfounded, it is interesting that the most abundant volatile organic compound in carob powder responsible for its characteristic cheesy butter aroma is isobutyric acid.²³ Isobutyric acid also happens to be one of, if not the most dominant fatty acid excreted within the vaginal secretions known as copulins. Copulins act as an important messenger or pheromone in primates signaling reproductive receptivity. Both the odorous and nonodorous chemical compositions within copulins can trigger behavioral and physiological responses in males.⁵¹ "Thus, changes in men's behavior and perceptions surrounding an ovulating woman may not be solely due to changes in her behaviorbut also related to fluctuations in concentrations of copulins specifically iso-butyric acid, in her vaginal secretions."⁵² Isobutyric acid concentration fluctuates during the menstrual cycle, peaking during ovulation and decreasing postmenopausally.⁵² Interestingly, men exposed to copulins perceive themselves as more sexually desirable. This line of reasoning supports our findings.⁵²

The innovative combination of jasmine and carob derivatives, working through oxytocin and pheromonal pathways, found within this formulation, appears to synergistically enhance romantic bonding and sexual satisfaction. Of note, two patients from the OX cohort withdrew from the study due to unexpected pregnancies. While causality cannot be definitively established, the potential influence of cutaneous oxytocin signaling on sexual intimacy, and pheromone-like effects of the copulin-like by-product cannot be overlooked. The impact that this may have had on patients within this cohort, perhaps by increasing their likelihood to engage in sexual intercourse and conceive, warrants further investigation.

4.1 | Limitations

The present study is not without its limitations. The single center nature and small sample size of 39 patients of this prospective trial may limit the generalizability of these findings to the broader population and reduce the statistical power in assessed outcomes. Further studies with larger and more diverse patient cohorts could further corroborate the present study's findings and enhance reliability. The application of skincare products, despite all subjects having been provided with identical instructions, may have introduced interpatient variability. Finally, the short follow-up time may preclude identification of improvements in some of the outcomes that may have required a longer duration of treatment to be declared, while simultaneously also limiting our understanding of the persistence of these

demonstrated benefits over time. The final two points represent an area of interest for ongoing studies.

5 | CONCLUSION

The present study assessing the novel OX skincare product demonstrated significant improvement in the psycho-social-dermal axis in patients using the product for 4 and 8 weeks, including skin quality, confidence, romantic relationships, sexual satisfaction, perceived attractiveness, and youthfulness, with superior results observed with longer, 8-week durations of use. These findings identify a unique combination of phospholipids and botanicals with epidermal, oxytocin, and pheromone-like effects that work synergistically to improve skin quality, quality of life, and self-esteem. Future studies will undoubtedly further elucidate the specific pathways at play and leverage this novel proposed therapeutic target to continue to revolutionize and improve upon our understanding of anti-aging and mood enhancing skincare.

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CONFLICT OF INTEREST STATEMENT

S.F. is a consultant/speaker for Abbvie, Galderma, Merz esthetics, Xomd, Revance; has received research support from Abbvie, Galderma, Merz, Revance, L.C. has no conflicts of interest to disclose. B.C. has no conflicts of interest to disclose. J.P. has no conflicts of interest to disclose. M.C. has no conflicts of interest to disclose. S.D. is a consultant/speaker for Abbvie, Galderma, Merz, Xomd, Evolus, has received research support from Abbvie, Galderma, Merz, Revance.

DATA AVAILABILITY STATEMENT

Research data are not shared.

ETHICS STATEMENT

All patients included in this clinical study provided written and verbal consent to participate and be photographed and video recorded.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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