The Efficacy of Topical 1% Cannabidiol for Eyebrow Regrowth: A Randomized, Double-blind, Placebo-controlled Pilot Study with a Split-side Comparative Design

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Abstract

Eyebrow hypotrichosis constitutes a significant source of distress for individuals, impacting their self-confidence and non-verbal communication. Existing research has established the potential of cannabidiol (CBD) to stimulate hair growth in androgenetic alopecia patients. CBD achieves this by promoting hair elongation, extending the anagen phase, delaying the catagen phase, and reducing inflammatory cytokines, ultimately facilitating hair growth. This study aims to extend this knowledge to address eyebrow regrowth by investigating the efficacy of topical 1% CBD. Over a three-month period, thirty volunteers experiencing eyebrow hypotrichosis participated in the study. They were randomly assigned to apply topical 1% CBD to one eyebrow and a placebo to the other daily for three months, with monthly assessments conducted. Efficacy was assessed through eyebrow hair count, the global eyebrow assessment scale, the global photographic assessment, patient satisfaction, and monitoring adverse events. The results revealed a significant 82% increase in eyebrow regrowth in the 1% CBD group compared to the placebo group after three months. Self-assessments using the global eyebrow assessment and global photographic assessment tools by the participants themselves also demonstrated improved scores on the cannabidiol-treated side. Importantly, no serious side effects were reported. In conclusion, the application of topical 1% CBD emerges as a promising, safe, and well-tolerated approach for promoting eyebrow regrowth. This treatment option offers cost-effectiveness and accessibility, making it a viable choice for individuals seeking to address eyebrow hypotrichosis. Further research with larger populations and longer follow-up periods is recommended to validate and expand upon these findings.

Keywords**:** *Eyebrow Regrowth, Cannabinoids, Cannabidiol (CBD), Cannabis Sativa, Topical Cannabidiol, Hair Growth*

1. Introduction

The eyebrows serve crucial functions in facial aesthetics and social communication. Hypotrichosis of the eyebrows, characterized by diminished eyebrow hair, can significantly impact an individual's well-being, affecting functionality, psychology, and social interactions. While addressing underlying causes like leprosy, hyper/hypothyroidism, or frontal fibrosing alopecia can potentially restore eyebrow growth, these conditions may not apply to cases of primary eyebrow hypotrichosis, often of idiopathic origin (Kumar, & Karthikeyan, 2012; Velez, Khera, & English, 2007; Vij, & Bergfeld, 2015). Primary eyebrow hypotrichosis denotes instances where eyebrow thinning lacks an attributable medical condition. The United States Food and Drug Administration has approved bimatoprost, an ophthalmic prostamide analog, for treating eyelash hypotrichosis (Chanasumon, Sriphojanart, & Suchonwanit, 2018). This substance stimulates dermal papilla and melanocyte prostaglandin receptors, thereby prolonging the anagen phase and enhancing melanogenesis. Consequently, hair follicles grow longer, thicker, and darker. Bimatoprost is sometimes employed off-label for eyebrow hypotrichosis, much like minoxidil, indicating its use without FDA approval for this specific purpose. However, this medication is costly and entails undesirable side effects, including hyperpigmentation.

Cannabis has gained widespread acceptance for medical use in our nation following its legalization. Nonetheless, knowledge regarding topical dermatological therapies remains limited. Several studies have

explored the benefits of cannabinoid use, with recent findings demonstrating that cannabidiol (CBD) promotes hair growth in androgenetic alopecia (AGA) patients (Smith, & Satino, 2021; Smith, 2023). While the precise mechanisms remain largely unknown, five main pathways have been proposed to elucidate how CBD encourages hair elongation, prolongs the anagen phase, delays the catagen phase, and reduces inflammatory cytokines, thereby stimulating hair growth (Gupta, & Talukder, 2022). These mechanisms include CBD functioning as a negative allosteric modulator of the cannabinoid receptor type 1 (CB1) (Gupta, & Talukder, 2021; Laprairie, Bagher, Kelly, & Denovan-Wright, 2015). Additionally, CBD has shown the capacity to activate the Wnt/Beta-catenin signaling pathway, fostering the differentiation of dermal progenitor cells into new hair follicles and thus promoting hair growth (Gupta, & Talukder, 2021; Smith, & Satino, 2021). Furthermore, CBD has been found to induce rapid desensitization of the transient receptor potential cation channel subfamily V member 1 (TRPV1), contributing to hair growth (Bíró et al., 2006; Smith, & Satino, 2021). When administered within an optimal concentration range, cannabidiol does not activate TRPV4, reducing the risk of hair loss induction (Smith, & Satino, 2021; Szabó et al., 2020). Lastly, cannabidiol may inhibit proinflammatory cytokines via adenosine receptors, potentially creating a favorable environment for hair growth (Szabó et al., 2020).

Notably, the effect of cannabidiol on eyebrow hair growth, particularly in various facial regions, has not been previously studied. Additionally, there is evidence indicating that 1.6% CBD can decrease intraocular pressure, returning to baseline afterward (Senapati et al., 2022). Given that the effects of cannabidiol are dose-dependent (Smith, & Satino, 2021), this study aims to investigate how 1% CBD affects eyebrow regrowth. Consequently, topical 1% cannabidiol may emerge as a cost-effective and accessible alternative for the treatment of eyebrow hypotrichosis. Further research is required to corroborate these findings and explore the optimal concentration of CBD for maximizing efficacy.

2. Objectives

1) To explore the potential of topical 1% cannabidiol for eyebrow regrowth.

2) To evaluate the safety of one percent topical cannabidiol.

3. Materials and Methods

The study was subsequently conducted as a randomized, double-blind, placebo-controlled pilot study with a split-side comparative design. It spanned three months following protocol approval by the Human Research Ethics Committee of Thammasat University. Participant involvement occurred at the Department of Dermatology, Benchakitti Park Hospital, Thailand.

3.1 Patient selection

The study comprised 30 male and female participants aged 18 years and older who sought eyebrow improvement. Exclusion criteria were applied to volunteers with the following conditions:

1. Dermatological and autoimmune conditions: alopecia areata, history of trichotillomania, atopic dermatitis, seborrheic dermatitis, lupus erythematosus, and scleroderma

2. Eye-related conditions: acute or chronic eye infections, glaucoma, retinal detachment, and active conjunctivitis (conjunctivitis should be treated before inclusion).

3. Infectious diseases: leprocy and syphilis

4. Endocrine and systemic conditions: history or clinical diagnosis of thyroid diseases and serious systemic illnesses

5. Other exclusions: participants displaying signs of irritation or infection in the eyebrow area, planned travel to countries where CBD is prohibited, ongoing minoxidil, finasteride, or bimatoprost treatment, and undergoing eyebrow tattooing or eyebrow transplant procedures within the past 2 years.

3.2 Study methods

The topical 1% cannabidiol formulation is produced by Posh Medica Lifetech Company, and pure cannabidiol samples are sourced from SALUS Bioceutical Company. The formulation comprises clear-colored substances, including a caprylic oil base, pentaerythrityl tetra-di-t-butyl hydroxyhydrocinnamate for stabilization, cannabidiol as the active ingredient, and ethylhexylglycerin as the preservative agent. Furthermore, a placebo substance devoid of cannabidiol replaces the active ingredient in the study, maintaining uniform packaging in identical tubes, each containing approximately 3 ml of oil base with an applicator for eyebrow application.

Participants are randomized to either the placebo or intervention group during the initial visit, employing a double-blind technique. Subsequently, a mid-pupil vertical line and a 1-centimeter square are marked, and plastic paper is used as a precise landmark for subsequent visits, serving as a reference point for hair counting.

Upon the first application of topical cannabidiol, an immediate allergic reaction is assessed, and participants are instructed to conduct a one-week use test for delayed allergic reactions. Patients are directed to apply the product once daily in the morning for a three-month duration. Monthly assessments are conducted, with the exception of adverse event evaluations, which include an early phone interview on day 14 and subsequent monthly assessments.

Hair counts are assessed at baseline and during the follow-up period, which includes the first, second, and third months. The global eyebrow assessment scale (GEBA) is evaluated at baseline and at the end of the third month. Global photographic assessments, patient satisfaction, and adverse events are assessed in the first, second, and third months of the study.

3.3 Assessments

Hair counts will be obtained without eyebrow tattooing at the predetermined reference position using a Dino-Lite portable digital microscope at baseline and at each subsequent visit, maintaining a fixed magnification. Additionally, digital photographs will be taken at every visit using a digital camera (OLYMPUS OM-D E-M10) with consistent settings.

The Global Eyebrow Assessment Scale (GEBA) utilizes a photonumeric grading system consisting of four grades: Grade I, indicating very sparse; Grade II, sparse; Grade III, full; and Grade IV, very full. During the baseline visit and at the three-month mark following topical application, two dermatologists, blinded to the study and the participants, evaluate the GEBA scale

The global photographic assessment compares photographs taken using a digital camera with those obtained during the baseline visit, graded on a scale with five categories or quartile grading (0 representing no change or worsening, 1-25% increase, 26-50% increase, 51-75% increase, and greater than 75% increase). Two blinded dermatologists conduct the assessment, and patients self-evaluate their effectiveness using the same scale.

Satisfaction is assessed through the completion of an assessment form, with subjects queried regarding their level of satisfaction with the topical cannabidiol's effects. The five-point scale ranges from -1 to +3, with -1 indicating dissatisfaction, 0 indicating average, +1 indicating satisfaction, +2 indicating very satisfaction, and +3 indicating extreme satisfaction.

Adverse events are evaluated on day 14 and monthly during the follow-up period. Participants are queried about symptoms such as itchiness, burning, redness, scaling, and other adverse reactions, which are graded as mild, moderate, or severe based on their responses. Physicians examine the eyebrows for erythema, scaling, edema, or vesicles.

3.4 Statistical analysis

The data were analyzed using IBM SPSS Statistics version 26. Qualitative data were presented as numbers and percentages. The difference in eyebrow hair count between the cannabidiol and placebo groups was assessed using a paired t-test. Additionally, the intraclass correlation coefficient was utilized to evaluate the agreement between two dermatologists. The comparison of difference scores between the two groups in the global photographic assessment and GEBA scale was performed using the Wilcoxon signed rank test. Furthermore, the comparison of satisfaction scores was also conducted using the Wilcoxon signed rank test. All statistical analyses were conducted at a significance level of $p < 0.05$, with a 95% confidence interval not including 1 for ratio data and not including 0 for numerical data.

4. Results and Discussion

4.1 Results

4.1.1 Demographic data

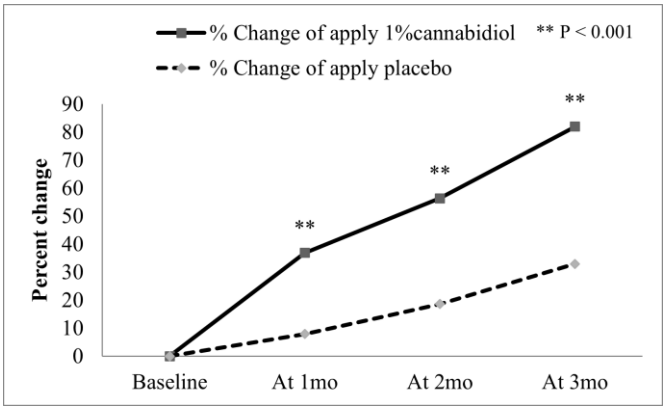
Out of the 30 initially enrolled subjects, 29 completed the study, with one dropout due to personal reasons. The participants had a mean age of 45.2 years (SD = 13.21). Baseline characteristics are presented in Table 1. Notably, no statistically significant differences were observed in eyebrow hair count or the global eyebrow assessment scale between the cannabidiol and placebo groups, as indicated in Table 2.

Table 1 Baseline demographic characteristics of participants

Demographic data	Values (n = 30)	95% confidence interval
Gender		
Male	4 (13.3%)	4.7%-28.7%
Female	26 (86.7%)	71.3%-95.3%
Age (years)		
Mean ± SD	45.2 ± 13.21	40.27-50.13
Min - Max	22 - 65	
Underlying diseases		
Hypertension	2 (6.7%)	1.4%-19.7%
Diabetes	2 (6.7%)	1.4%-19.7%
Hyperlipidemia	2 (6.7%)	1.4%-19.7%
Gout	1 (3.3%)	0.4%-14.5%
Underwent eyebrow tattooing within 2 years	7 (23.3%)	11.1%- 40.4%

4.1.2 Hair count of eyebrow

Baseline eyebrow hair counts did not differ significantly between the cannabidiol and placebo groups. However, both groups exhibited a statistically significant increase in eyebrow hair count over the study period. Notably, a significant difference in percent change was observed between the cannabidiol and placebo groups, indicating a greater improvement in the cannabidiol group from the first month of application onwards. Specifically, the group using 1% cannabidiol showed an 82.02% increase in eyebrow hair count in the third month, with a 95% confidence interval of 70.53 to 93.52 compared to baseline. Moreover, compared to the placebo group in the third month, the cannabidiol group demonstrated a percent difference of 49.06, with a 95% confidence interval between 38.21 and 59.92 ($P < 0.001$). Additionally, Figure 1 visually



illustrates the comparison between percentage changes in the cannabidiol and placebo groups, as described earlier.

Table 2 Hair count of eyebrow

Time	1% Cannabidiol	Placebo	Difference (95%CI)	*p*-value
Baseline	48.2 ± 12.38	49.57 ± 10.92	-1.37 (1.46, -4.35)	0.357
Percent change at 1 month	36.87 (28.02, 45.73)	7.96 (2.49, 13.43)	28.91 (19.76, 38.06)	<0.001*
Percent change at 2 months	56.39 (47.51, 65.27)	18.66 (12.48, 24.85)	37.72 (29.72, 45.73)	<0.001*
Percent change at 3 months	82.02 (70.53, 93.52)	32.96 (24.85, 41.07)	49.06 (38.21, 59.92)	<0.001*

Figure 1 Change after applying 1% cannabidiol

4.1.3 Reliability Statistics

The consistency of evaluations by two blinded dermatologists was assessed using the intraclass correlation coefficient (ICC) as a statistical measure of agreement. The analysis yielded an ICC value of 0.845 (95% CI: 0.74-0.90) for the Global Eyebrow Assessment Scale (GEBA) and 0.917 (95% CI: 0.87 - 0.95) for the global photographic assessment, indicating a high level of agreement between the two dermatologists' evaluations on both the cannabidiol and placebo sides. These values suggest that the GEBA scale and global photographic assessment were consistently applied by the observers, thus confirming the reliability of the subjective outcome measures utilized in our study.

Table 3 Reliability Statistics

	Inter observation	
	1% Cannabidiol	Placebo
Global eyebrow assessment scale by Dermatologists 1 and 2	0.845 (0.74 to 0.907)	0.845 (0.74 to 0.907)
Global photographic assessment by Dermatologists 1 and 2	0.917 (0.874 to 0.946)	0.915 (0.871 to 0.944)

4.1.4 Global eyebrow assessment scale (GEBA)

Based on the data collected, it is evident that there are no significant differences in baseline characteristics between the two groups. Upon analyzing improvements in the global eyebrow assessment scale in the third month within each group, statistically significant changes are observed in both groups, whether evaluated by the volunteers themselves or by two blinded dermatologists.

Furthermore, when the evaluation is performed by the volunteers themselves, a statistically significant difference is observed between the two groups. Specifically, in the cannabidiol group, 16 volunteers achieved a full eyebrow scale, and 13 volunteers achieved a very full eyebrow scale, while on the placebo side, there were not only 16 full eyebrow and 11 very full eyebrow but also 2 volunteers with sparse eyebrow scales.

Conversely, when the evaluation is conducted by two blinded dermatologists, the differences between the two groups are not statistically significant.

4.1.5 Global Photographic Assessment

The data in Table 4 reveals a statistically significant improvement in the scores assessed by volunteers, starting from the second month after the application of the substance and continuing throughout the study. By the third month, the cannabidiol group displayed significant results, with one individual reporting a 26-50% increase in eyebrow score, seven individuals reporting a 51-75% increase, and 21 individuals, accounting for 72.4% of the volunteers, reporting an increase in eyebrow score exceeding 75%. Conversely, on the placebo side, 75% of volunteers reported a 51-75% increase in eyebrow score.

However, when evaluating the scores provided by two blinded dermatologists, no statistically significant differences were observed between the cannabidiol and placebo groups. Nevertheless, it is worth noting that both sides demonstrated a positive trend in eyebrow growth.

Table 4 Global photographic assessment

Assessment		At 2 months			At 3 months		
		apply 1% cannabidiol	apply placebo	*p*-value	apply 1% cannabidiol	apply placebo	*p*-value
by Volunteer	no change	0 (0%)	0 (0%)	0.003*	0 (0%)	0 (0%)	<0.001*
	increase 1-25%	1 (3.3%)	1 (3.3%)		0 (0%)	0 (0%)	
	increase 26-50%	3 (10%)	11 (36.7%)		1 (3.4%)	2 (6.9%)	
	increase 51-75%	24 (80%)	17 (56.7%)		7 (24.1%)	22 (75.9%)	
	increase > 75%	2 (6.7%)	1 (3.3%)		21 (72.4%)	5 (17.2%)	
by Dermatologist 1	no change	0 (0%)	0 (0%)	0.564	0 (0%)	0 (0%)	0.083
	increase 1-25%	7 (23.3%)	7 (23.3%)		1 (3.4%)	0 (0%)	
	increase 26-50%	10 (33.3%)	9 (30%)		7 (24.1%)	6 (20.7%)	
	increase 51-75%	13 (43.3%)	14 (46.7%)		16 (55.2%)	18 (62.1%)	

	increase > 75%	0 (0%)	0 (0%)		5 (17.2%)	5 (17.2%)	
by Dermatologist 2	no change	0 (0%)	0 (0%)	1	0 (0%)	0 (0%)	1
	increase 1-25%	11 (36.7%)	11 (36.7%)		2 (6.9%)	2 (6.9%)	
	increase 26-50%	8 (26.7%)	8 (26.7%)		12 (41.4%)	12 (41.4%)	
	increase 51-75%	11 (36.7%)	11 (36.7%)		12 (41.4%)	12 (41.4%)	
	increase > 75%	0 (0%)	0 (0%)		3 (10.3%)	3 (10.3%)	

4.1.6 Level of Satisfaction

Based on the data collected, there is a clear trend indicating an improvement in satisfaction scores over time. By the third month after the application of either cannabidiol or the placebo, a significant increase in satisfaction levels was observed, with 48.3% of participants reporting as "very satisfied" and 51.7% reporting as "extremely satisfied." This rise in satisfaction was found to be statistically significant when compared to the scores reported in the first month. Moreover, the trend of increasing satisfaction scores began to manifest improvement as early as the second month of the study.

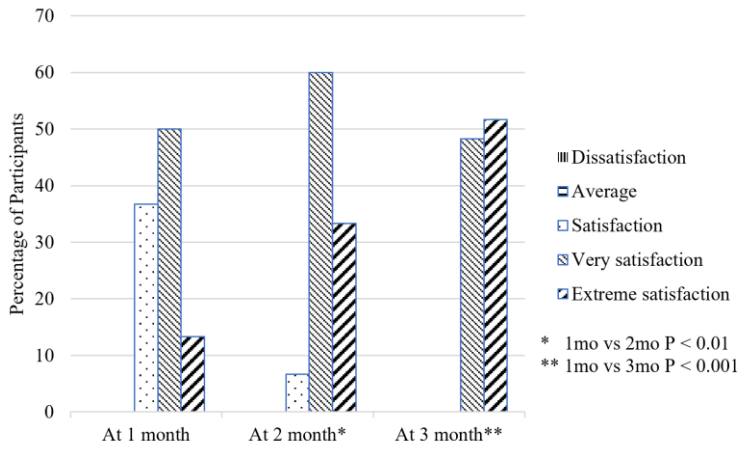


Figure 2 Level of satisfaction

4.1.7 Safety (adverse effects)

Notably, during the second week following the initiation of cannabidiol application, 9 individuals reported experiencing mild pruritus, while 1 individual reported mild burning sensations. However, as the study progressed to the third month of cannabidiol use, there was a notable reduction in adverse events. At this stage, only 1 individual reported mild pruritus, and the remainder reported no adverse events. Furthermore, throughout the study, no major side effects were observed.

4.2 Discussion

In a recent study by Smith et al. (2023), a formulation containing 0.03% cannabidiol, along with various cannabinoids such as tetrahydrocannabivarin (THCV), cannabidivarin (CBDV), menthol, eucalyptus oil, ethanol, Emu oil, hexafluoroacetone propellant, and dimethicone, was applied topically once daily for six months in patients with androgenetic alopecia. However, a separate study conducted in 2022, which assessed the tolerability of topical cannabidiol and its effects on the eyes (Senapati et al., 2022), revealed that a 1.6% cannabidiol formulation could decrease intraocular pressure by 19.9% within 300 minutes, returning to baseline levels afterward. Consequently, in our study, researchers opted for a 1% cannabidiol concentration, as it is known that the effects of cannabidiol are dose-dependent (Smith, & Satino, 2021), and this concentration does not lead to an increase in intraocular pressure.

The effect of cannabidiol (CBD) on hair growth is dose-dependent (Smith, & Satino, 2021); however, higher doses may lead to premature entry into the catagen phase through activation of the transient receptor potential cation channel subfamily V member 4 (TRPV4). The mechanisms underlying CBD's impact on hair growth are not entirely clear, and further definitive research is planned. Nevertheless, findings from several in vitro and ex vivo studies suggest that cannabidiol may promote hair regrowth through five potential mechanisms. Firstly, CBD functions as a negative allosteric modulator of the cannabinoid receptor type 1 (CB1) (Gupta, & Talukder, 2021; Laprairie et al., 2015). Secondly, CBD has demonstrated the ability to stimulate the Wnt/Beta-catenin signaling pathway, facilitating the differentiation of dermal progenitor cells into new hair follicles and thereby promoting hair growth (Gupta, & Talukder, 2021; Smith, & Satino, 2021). Thirdly, CBD has been shown to induce rapid desensitization of the transient receptor potential cation channel subfamily V member 1 (TRPV1), contributing to hair growth (Bíró et al., 2006; Smith, & Satino, 2021). Fourthly, when administered within an optimal concentration range, cannabidiol does not activate TRPV4, mitigating the risk of inducing hair loss (Smith, & Satino, 2021; Szabó et al., 2020). Lastly, cannabidiol may inhibit proinflammatory cytokines via adenosine receptors, potentially creating a conducive environment for hair growth (Szabó et al., 2020). It is important to note that while these mechanisms are proposed, further comprehensive research is necessary to confirm and elucidate the precise pathways through which CBD influences hair growth.

In this study, the efficacy of 1% cannabidiol was assessed through eyebrow hair count, revealing statistically significant differences between the cannabidiol and placebo groups as early as the first month following daily topical substance application. These differences persisted throughout the study. Specifically, the cannabidiol group exhibited a statistically significant increase in eyebrow hair count, indicating an 82% increase in nonvellus hair from baseline. In contrast, the placebo group demonstrated a 32.96% increase, highlighting a substantial difference between the two groups.

For context, a previous study (Smith, & Satino, 2021) utilized an average daily dose of 3-4 mg of cannabidiol and minimal amounts of other cannabinoids, excluding THCV and CBDV, over ~~a~~ six-month in individuals with androgenetic alopecia. This prior research yielded a statistically significant 93.5% increase in nonvellus hair after six months.

Another study conducted in 2023 (Smith, 2023) investigated a topical hemp extract formulation containing approximately 0.03% cannabidiol, along with THCV and CBDV as active ingredients, for the improvement of hair growth in androgenetic alopecia patients. This treatment was administered once daily for six months and resulted in an average hair increase of 163%.

In contrast to these previous studies, our research applied the substance for a shorter duration and utilized a 1% cannabidiol formulation. Although the precise percentage of cannabidiol used in previous research was not available, our study's longer substance application period may have contributed to a potentially higher increase in eyebrow hair growth. Furthermore, our study exclusively focused on cannabidiol as the active ingredient, distinguishing it from previous studies that employed a variety of cannabinoids as active ingredients.

In this study, the global eyebrow assessment scale (GEBA) showed a statistically significant improvement when assessed by volunteers (self-assessment) in the group that applied cannabidiol compared to the placebo group. This trend was similarly observed in the global photographic assessment. Specifically, the results from the GEBA scale indicated an overall improvement in the cannabidiol-treated group, with

55.2% reporting a full eyebrow and 44.8% reporting a very full eyebrow, compared to baseline. In contrast, the baseline measurements on the cannabidiol side showed 3.3% with very sparse eyebrows, 56.7% with sparse eyebrows, and 40% with full eyebrows. Furthermore, the statistical analysis revealed a significant advantage for the cannabidiol-treated side compared to the placebo side.

Focusing on the global photographic assessment, volunteers assessed a greater than 75% increase in eyebrow hair density in 72.4% of cases on the cannabidiol-treated side, compared to only 17.2% on the placebo side. These results indicated a statistically significant difference between the two groups.

However, when the GEBA scale and Global Photographic Assessment were evaluated by two blinded dermatologists, no statistically significant differences were observed between the two groups. Nevertheless, improvements in eyebrow appearance were noted in both groups. Regarding the GEBA scale, within-group analyses demonstrated statistically significant improvements in both the cannabidiol and placebo groups, with similar percentages of sparse, full, and very full eyebrows. However, when comparing the two groups, the scores were nearly equal, resulting in a lack of statistical significance. For the global photographic assessment, the data showed a similar trend to the GEBA scale, with nearly equal ranges of improvement in both the cannabidiol and placebo groups.

These disparities in assessment outcomes can be attributed to various factors. Firstly, differences may arise from individual perceptions and satisfaction with their ~~own~~ appearance. Additionally, blinded dermatologists typically rely on clinical signs and follow a standardized approach when grading changes, whereas volunteers may focus on more personal or cosmetic aspects such as eyebrow thickness or overall facial aesthetics. Nevertheless, both groups demonstrated statistically significant improvements in GEBA scale scores when conducting within-group analyses compared to baseline, and the global photographic assessment also showed improvement in both groups.

In this study, the safety and adverse events related to cannabidiol use by the volunteers were carefully monitored. Immediate allergic reactions were assessed by applying a topical substance to the antecubital area and observing for at least 30 minutes. The results indicated the absence of immediate allergic reactions among the participants. Furthermore, to evaluate delayed allergic reactions, volunteers were instructed to perform the use test. During this test, they were required to apply the substance to the antecubital area in a 5-centimeter square grid for one week and to promptly report any adverse events. Notably, there were no instances of delayed allergic reactions reported among the volunteers. Minor adverse effects, such as mild itchiness and mild burning sensations, were the only adverse events reported. These effects gradually diminish over time. In the second week after commencing use, nine individuals reported experiencing mild itchiness, while one individual reported mild burning sensations. However, by the third month, only one subject experienced mild itchiness, and there were no reports of burning sensations or any other adverse events.

It is worth highlighting that the data on adverse effects corresponded with the satisfaction scores provided by the subjects. In both groups, subjects expressed satisfaction, with significantly higher satisfaction scores in the third month compared to the first month after use. By the third month, no participants reported dissatisfaction, an average level of satisfaction, or regular satisfaction. Instead, all reported either high levels of satisfaction (with 14 individuals expressing ‘very satisfied') or extremely high levels of satisfaction (with 15 individuals indicating 'extreme satisfied '). In contrast, during the first month, 11 individuals reported satisfaction, 15 individuals expressed very satisfaction, and 4 individuals conveyed extreme satisfaction.

Given that the eyebrow hair cycle may take up to 14 -17 months to complete (Buffoli et al., 2014), observing the effects for more than three months could reveal significant differences between the two groups. This may also impact the results of global eyebrow assessments and global photographic assessments conducted by dermatologists. Further studies are warranted to explore this hypothesis in depth.

Therefore, this study offers initial evidence supporting the effectiveness of topical 1% cannabidiol for promoting eyebrow regrowth. The treatment was well-tolerated and resulted in significant improvements in hair count and patient satisfaction, with minor adverse effects such as mild itchiness that gradually decreased over time. These findings present potential alternatives for patients seeking cost-effective solutions to enhance their eyebrows.

However, the mechanisms underlying the effects of cannabidiol remain incompletely understood. As previously discussed, five potential pathways have been proposed. Further investigations are required to

ascertain the precise mechanism of cannabidiol. The study's limitations include a small sample size and the absence of a long-term follow-up period. These limitations could potentially be addressed in future research endeavors. Since it is known that cannabidiol acts in a dose-dependent manner, there is a need to determine the accurate concentrations of cannabidiol, as previous studies have not provided precise concentrations for optimal hair growth stimulation. This is an important avenue for further research to achieve the most effective stimulation of hair growth.

5. Conclusion

Based on the findings, the application of topical 1% cannabidiol presents a promising, safe, and well-tolerated approach for promoting eyebrow regrowth. This treatment option offers cost-effectiveness and accessibility, effectively addressing the concerns associated with eyebrow hypotrichosis.

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