



The Effectiveness of 3% Hemp Seed Extract and 20% Vitamin C Serum for the Treatment of Inflammatory Acne on Face

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Abstract

BACKGROUND: Hemp (*Cannabis sativa* L.) is a widespread member of the Cannabaceae family of plants. For thousands of years, cannabis has been utilized as medicine. Atopic dermatitis, allergic contact dermatitis, psoriasis, and acne could all potentially benefit from its anti-inflammatory and anti-pruritic properties. Due to its capacity to regulate the proliferation, differentiation, and survival of basal cells, it also contributes to skin renewal and anti-aging. Hemp oil also has anti-microbial effects against *Propionibacterium acnes*. Vitamin C is one of the most widely used antioxidants for protecting the skin. Topical vitamin C is used for its photoprotective and anti-inflammatory effects. As it is essential for collagen synthesis, it is also used for its wound healing effects. It has an excellent efficacy in the treatment of acne vulgaris.

OBJECTIVE: To study about the clinical efficacy of the serum containing hemp seed extract and vitamin C for the treatment of inflammatory acne on face.

MATERIALS AND METHODS: This research is quasi-experimental controlled study with 20 participants and the duration is 12 weeks period. The study population is healthy male and female between the age of 18-35 years old. They need to apply 3% hemp seed extract and 20% vitamin C serum on the whole face twice a day for 12 weeks. Improvement of acne was evaluated at baseline, 4th, 8th and 12th week by facial acne lesion count, global acne grading system and Sebumeter along with photographs from Visioscan. Satisfactory score and adverse effects of the volunteers were observed and independently evaluated by three dermatologists and will be recorded throughout the study.

RESULTS: The outcome of the mean change of acne lesion count, Global Acne Grading Scores and sebumeter scores were significantly decreased in different visit. Thus, 3% hemp seed extract and 20% vitamin C serum could decrease the sebum production and improve the inflammatory acne. This study of 3% hemp seed extract and 20% vitamin C serum also achieved high participants' satisfactory score and no adverse effect was detected.

CONCLUSION: The outcome of this study suggested that 3% hemp seed extract and 20% vitamin C serum is effective for the treatment of inflammatory acne on face and safe for topical application. Hence, it could be an alternative treatment for inflammatory acne on face.

Index Terms Hemp Seed Extract, Inflammatory Acne, Sebumeter, Vitamin C.

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INTRODUCTION

Acne vulgaris is a common cutaneous disorder affecting around 85% of the teenagers globally, which is the 8th frequent disorder in the planet (Bernales Salinas, 2021). The blockage of the hair follicles causing the inflammation of pilosebaceous units under the skin led to acne (Vsanth et al.,2020). Although it is not life-threatening, acne impacts psychosocially on many aspects in life's quality, such as socialization, perception, health of emotion and opportunities in occupations, and sometimes concerned with depression and anxiety, in the same time, unsatisfaction of the body (Mardani, Mozafarpour, Goodarzi, & Nikkhah, 2021). Abnormal desquamation of follicles, sebum overproduction, proliferation of *P. acnes* and inflammation are the four main pathological factors that are responsible for the development of acne (Gollnick et al.,2003).

Acne's common features involve seborrhea, non-inflammatory lesions (open and closed comedones), inflammatory lesions (papules and pustules), and various degrees of scarring (Williams, Dellavalle, & Garner, 2012). Generally, acne was classified into those types of inflammations and non-inflammations. Inflammations consist of papulation, pustulation, cystic formation and nodulation. Non-inflammations are open comedones and unopened or closed ones. Word like 'non-inflammation' seems to be convention still, yet truly a misnomer. Current information advised subclinical inflammation of perifollicles actually precedes microcomedones formation. It proves out that comedones are actually kind of inflammations. Inflammatory acne can lead to potentially disfiguring scarring and post-inflammatory hyperpigmentation, which makes the treatment more important (Das & Reynolds, 2014).

To treat and control those existing acnes, prevent those unwanted scars, to limit the time of disease and to allow the

minimization of the morbidity are the aims of acne treatment. The alternatives are using those remedies from nature or using treatments which aren't drug based, like optical therapy. Among all treatment modalities, topical products have the advantage of being applied to the affected area directly; thus, decreasing systemic absorption and increasing the exposure of the pilosebaceous units to the treatment (Fox, Csongradi, Aucamp, du Plessis, & Gerber, 2016).

For many years, the first line treatments for inflammatory acne are topical retinoid and topical benzoyl peroxide. Oral antibiotic or oral isotretinoin may be prescribed in severe cases. These drugs are known to cause many side effects such as peeling, itching, redness and excessive dryness. In rare but severe cases, the side effects such as skin discoloration, photosensitivity to UV light, blistering, etc. may also be experienced. Besides, antibiotic resistance has been increasing in prevalence within the dermatologic setting. To overcome these problems, many medicinal plants and cosmeceutical products have been widely studied as alternative pathways for the treatment of acne.

Hemp has been used as a medicine for millenaries of age. It has been recommended for the treatment of gout, abnormal menstruation, malaria, rheumatism and constipation (Maule, 2015). Moreover, it has a potential therapeutic role for managing those diseases like allergic contact dermatitis, atopic dermatitis, psoriasis, and acne as it has anti-inflammatory and anti-pruritic properties. It also plays a role in skin rejuvenation and anti-ageing, on account of able to control proliferation, differentiation and survival of basal cells (Sheriff, Lin, Dubin, & Khorasani, 2020).

One of those popular antioxidants used to protect the skin is Vitamin C (Ascorbic acid) (Klock et al., 2005). Topical vitamin C is



known for its photoprotective and anti-inflammatory effects. It is also used for its wound healing effects as L-ascorbic acid is crucial for collagen synthesis (Pinnell & Madey, 1998). Vit C's constant derivative, i.e., SAP or Sodium Ascorbyl Phosphate, the ingredient which is active and non-irritant, is used in cosmetics to make the skin improve about the impurities and protect the skin from of acne vulgaris development (Klock et al., 2005).

To get maximal therapeutic effects for treating acne, topical products may combine more than one active ingredient in one formulation. The goal of this study is to evaluate the synergistic effects of topical hemp seed extract and vitamin C for the inflammatory acne on face. There has been no previous published research that have assessed the synergistic effect of these two compounds.

DETAILS EXPERIMENTAL

Twenty subjects, age 18-35 years with Fitzpatrick skin ranging from II to V having mild to moderate inflammatory acne are recruited. 3% hemp seed extract and 20% vitamin C serum was applied twice per day for 12 weeks. Furthermore, sunscreens were given to the subjects. Improvement of acne was assessed at baseline, 4th, 8th and 12th week by facial acne lesion count, global acne grading system and sebumeter along with photographs from Visioscan. Satisfactory score and adverse effects of the subjects were noted and independently assessed by three dermatologists and will be documented all through the research.

Sample Size Calculation

The study of the topical hemp seed extract and vitamin C serum for the treatment of inflammatory acne has never been demonstrated before. Hence, the similar article: Multicenter Randomized Comparative Double-Blind Controlled Clinical Trial of The Safety and Efficacy of Zinc Gluconate versus Minocycline

Hydrochloride in the Treatment of Inflammatory Acne Vulgaris (Dreno et al.,2001) is used for sample size population.

Statistical Analysis

The data collected from the study was analyzed statistically by using SPSS software and Microsoft Excel 2019. This was carried out at Mae Fah Luang University Hospital, Bangkok Thailand.

Results

According to the demographic data, 14 of the participants were female and 6 of the participants were male with mean age of 25.65 ± 4.36 years. Among 20 participants, 14 participants are students, and the rest are 4 employee and 2 employers. All participants do not have any underlying disease and they are healthy volunteers. All of them have no history of other treatments before the study. According to collected data, 10 volunteers have Fitzpatrick skin type II, 6 volunteers have Fitzpatrick skin type III and 4 volunteers have Fitzpatrick skin type IV.

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RESULTS AND DISCUSSION

3.1 Results of Acne Lesion Count

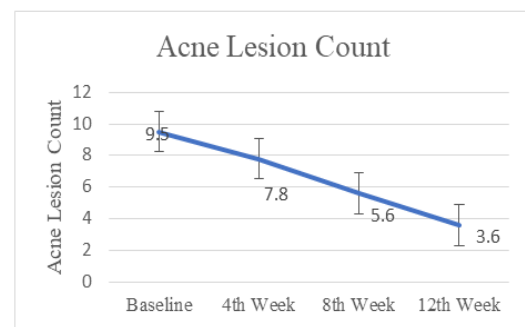


Figure 3.1 Linear graph revealing acne lesion count at 4th week, 8th week and 12th week.

The researcher performs facial acne count by counting the acne on face including comedones, papules, pustules and nodules at baseline, 4th, 8th and 12th week. When comparing the mean change of each visit, it is found that acne lesion count at 8th week is decreased than baseline(-3.900) which is



statistically significant at the level of 0.05 ($p < 0.05$). Moreover, acne lesion count at 12th week was lower than baseline (-5.900), 4th (-4.200) and 8th week (-2.000) which is statistically significant at the level of 0.05 ($p < 0.05$).

3.2 Global Acne Grading Score

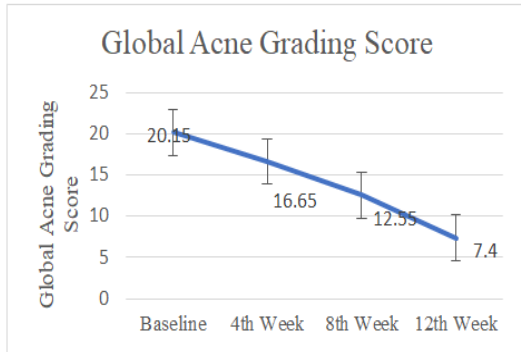


Figure 3.2 Linear graph revealing mean Global Acne Grading Score at baseline, 4th week, 8th week and 12th week.

According to the statistical analysis result from table 2, the Global Acne Grading System is a quantitative scoring system to determine the acne severity. Global Acne Grading Score at 8th week (7.600) was lower than baseline which is statistically significant at the level of 0.05 ($p < 0.05$). Moreover, Global Acne Grading Score at 12th week is lower than baseline (-12.750), 4th (-9.250) and 8th week (-5.150) which is statistically significant at the level of 0.05 ($p < 0.05$).

3.3 Sebumeter Score

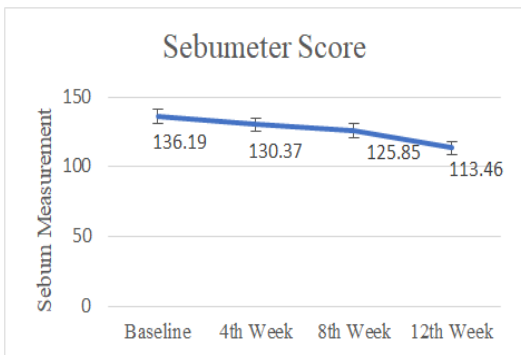


Figure 3.3 Linear graph showing sebumeter scores at baseline, 4th, 8th, and 12th week

Sebum production was measured with sebumeter. Sebumeter score at 8th week is lower than baseline (-10.333) which is statistically significant at the level of 0.05 ($p < 0.05$). Moreover, sebumeter score at 12th week is lower than baseline (-22.726), 4th (-16.912) and 8th week (-12.393) which is statistically significant at the level of 0.05 ($p < 0.05$).

3.4 Patients' Satisfactory Score

Satisfactory Score	
Score -1 = Unsatisfied	0
Score 0 = Indifferent	0
Score 1 = Somewhat satisfied	0
Score 2 = Moderately satisfied	2
Score 3 = Very satisfied	14
Score 4 = Completely satisfied	4

Participants rated the satisfactory score on 12th week. Regarding to the collected data, majority of the volunteers (n=14, 70%) were very satisfied. 2 volunteers (10%) rated moderate satisfaction and 4 volunteers (20%) rated complete satisfaction.

Adverse Effects

In all participants, no adverse effect was detected throughout the treatment with 3% hemp seed extract and 20% vitamin C serum.

Discussion

This was the study of 3% hemp seed extract and 20% vitamin C serum for the treatment of inflammatory acne on face. In this study, 20 volunteers were recruited, and all the volunteers came regularly and completed the study. To analyze the demographic data, descriptive statistical analysis was used. This was carried out in healthy male and female volunteers who were between 18-35 years old. The average age in this study was 25.65 ± 4.36 years with minimum of 17 years and maximum of 31 years. All the participants had no history of underlying disease, hypersensitivity, allergy and personal medication. All participants



have no history of treatment before the study. Most of the participants (n=10) had Fitzpatrick skin type IV and 6 had Fitzpatrick skin type III and 4 had Fitzpatrick skin type II.

In this study, acne lesion count, global acne grading system, sebumeter, patients' satisfactory score and adverse effects were measured to evaluate the efficacy of 3% hemp seed extract and vitamin C serum. For statistical analysis of evaluation score by acne lesion count, global acne grading system, sebumeter, Friedman test was used to analyze the data and post hoc test was used to compare with different visits. Descriptive analysis was used for patients' satisfactory score and adverse effects. The outcomes indicated that there was a statistically significant improvement of acne when compared to baseline visit. According to the collected data, the outcome of the efficacy of 3% hemp seed extract and 20% vitamin C serum is as following.

Improvement was measured with acne lesion count. According to the statistical analysis, the results of acne lesion count is increased statistically significant ($p < 0.001$). Evaluation score was improved and the mean scores were 7.80 ± 4.008 at 4th week, 5.6 ± 2.798 at 8th week and 3.60 ± 2.583 at 12th week. When comparing the mean change from each visit, statistical difference was seen between 4th and 8th week, 4th and 12th week ($p < 0.001$). However, the mean change between baseline and 4th week was not statistically significant. The results were indicating that the improvement was increased in each follow-up.

Global acne grading system was also used to evaluate the acne. Mean scores were reduced in each follow-up and it was statistically significant ($p < 0.001$). Mean Global Acne Grading Scores were 20.15 ± 7.802 at baseline and 16.65 ± 6.923 at 4th week, 12.55 ± 6.1 at 8th week and 7.40 ± 5.96 at 12th week.

Regarding to statistical analysis of sebumeter score, mean scores were 136.19 ± 35.25 on baseline visit, 130.37 ± 34.53 on 4th week, 125.86 ± 30.46 on 8th week and 113.46 ± 34.63 on 12th week. The data were indicated that mean sebumeter score was significantly increased at the level of 0.05 ($p < 0.001$). Therefore, mean sebumeter score on 12th week was remarkably higher than the mean sebumeter score on baseline, 4th week and 8th week. When comparing the mean change of sebumeter score from each visit, statistical difference was seen.

Patients' satisfactory score were recorded on 12th week. Amazingly, 70% (14 volunteers) rated score 3 (very satisfied) and only 10% (2 volunteers) rated score 2 (moderately satisfied). 20% (4 volunteers) scored 4 (completely satisfied). Therefore, 3% hemp seed extract and 20% vitamin C serum has high patients' satisfactory score. Throughout the study, no adverse effect was detected and the patch test did not show any allergic reaction. Hence, 3% hemp seed extract and 20% vitamin C serum is safe for topical application.

This study revealed that 3% hemp seed extract and 20% vitamin C serum is effective for treatment of inflammatory acne on face. This may be due to the properties of hemp seed extract and vitamin C. As hemp demonstrated anti-inflammatory and anti-pruritic properties, it has a potential therapeutic role in the management of acne (Sheriff, Lin, Dubin, & Khorasani, 2020). Sodium ascorbyl phosphate (SAP), a stable derivative of vitamin C, can be used as non-irritating active ingredient for cosmetics to improve skin impurities and to protect from the development of acne vulgaris (Klock et al., 2005).

CBD could be a novel therapeutic in the management of acne by acting on pathways relating to sebum production, sebocyte proliferation, and inflammation. The known anti-microbial effects of CBD may also



prove effective in acne treatment. In a clinical study involving men with buccal facial acne, a 3% cannabis seed extract containing cream led to decreased sebum content and erythema (Baswan et al., 2020).

Vitamin C has a strong antimicrobial activity on *P. acnes*, which is the major bacterium involved in developing acne vulgaris. The efficacy of vitamin C was superior to that of benzoyl peroxide, which is widely prescribed in the treatment of acne vulgaris in the western countries. These data show that vitamin C has an excellent efficacy in the treatment of acne vulgaris. It can be used as non-irritating active ingredient for cosmetics to improve skin impurities and to protect from the development of acne vulgaris. (Klock et al., 2005)

According to this study and results, 3% hemp seed extract and 20% vitamin C serum is safe and effective for treatment of inflammatory acne and well tolerated. Any adverse effects such as erythema, skin irritation and hyper or hypopigmentation were not detected. For better results and efficacy, it should be used longer in further studies.

CONCLUSION

Regarding this study, the outcome of the mean change of acne lesion count, Global Acne Grading Scores and sebumeter scores were significantly decreased in different visit. Thus, 3% hemp seed extract and 20% vitamin C serum could decrease the sebum production and improve the inflammatory acne. This study of 3% hemp seed extract and 20% vitamin C serum also achieved high participants' satisfactory score and no adverse effect was detected. To summarize, 3% hemp seed extract and 20% vitamin C serum is effective for treatment of inflammatory acnes and safe for topical application. Hence, it can be an alternative treatment for inflammatory acnes.

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