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Oral Aqueous Green Tea Extract and Acne Vulgaris: A Placebo-Controlled Study

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ABSTRACT

Green tea is an ancient beverage and a famous herbal medicine. Recently, it has been used successfully as a topical preparation in acne patients. The objective of the present study was to examine the effectiveness of oral green tea extract in a group of patients with mild-to-moderate acne vulgaris. In this double-blind, placebo-controlled, randomized clinical trial, 34 volunteers with mild-to-moderate acne vulgaris were randomly categorized in two, age and sex-matched groups, receiving either three capsules containing 500 mg aqueous extract of green tea in each (cases, n = 18), or placebo (controls, n = 16) three times daily for 30 consecutive days. Facial acne noninflamed, inflamed and total (noninflamed plus inflamed) lesion counts were documented at baseline, on week 2 and at endpoint (day 30) by an observer who was blind to the grouping of patients. In case group, there were 9 males (50%) and 9 females (50%) with a mean age of 14.3±1.8 years (range: 12-17). In control group, there were 11 males (68.8%) and 5 females (31.3%) with a mean age of 13.4±1.3 years (range: 12-16). The two groups were comparable for sex (p = 0.27) and gender (p = 0.11). The mean number of inflamed and total acne lesions decreased significantly more in the case group in comparison with that in the control group (p = 0.001 and 0.01, respectively). Similar difference was not found for noninflamed lesions (p = 0.33). This study showed that oral aqueous extract of green tea is effective against acne lesions in patients with mild-to-moderate disease.

Key words: Acne vulgaris, green tea, facial lesion

INTRODUCTION

Acne vulgaris is a very common skin disease, particularly among adolescents and young adults (Khondker and Khan, 2014). Nowadays, there are many topical and systemic medications available that can be used for treating this bothersome skin disease (Babaeinejad *et al.*, 2011; Khodaeiani *et al.*, 2012; Babaeinejad and Fouladi, 2013; Fouladi, 2013; Khodaeiani *et al.*, 2013). Despite high effectiveness of these medications in many cases, accompanying complications have forced scientists toward more natural products, especially herbal remedies (Fouladi, 2012; Bilgili *et al.*, 2014).

Green tea is a widely consumed beverage all over the world. It is unfermented dried leaves extract of *Camellia sinensis*, which is believed to be associated with various medicinal properties including anti-microbial, anti-tumor, anti-inflammatory, anti-oxidative and even anti-aging effects (Sharma *et al.*, 2012).

Several *in vitro* studies have suggested effectiveness of green tea against acne vulgaris (Jung *et al.*, 2012; Yoon *et al.*, 2013). Some authors have reported effectiveness of green tea topical preparations in these patients (Elsaie *et al.*, 2009; Mahmood *et al.*, 2010; Rasheed *et al.*, 2012). However, there is no study on the effectiveness of oral green tea extracts against acne vulgaris. This study sought to examine the therapeutic effect of oral green tea extract in volunteers with mild-to-moderate acne vulgaris.

MATERIALS AND METHODS

In this study patient-blind, placebo-controlled, randomized clinical trial, a total of 40 adolescent and young adult volunteers with moderate-to-severe acne vulgaris (Burke and Cunliffe, 1984) were recruited from a private clinic from March 2014 to July 2014.

Patients with acne vulgaris secondary to known etiologies, pregnant women, patients with other concomitant skin disease in their face and those on known anti-acne treatments started from the previous 3 months, were not included.

A powdered sample (250 g) of air-dried green tea (*Camellia sinensis*) leaves obtained from a local market and was boiled slowly in 1000 mL of distilled water, filtered and concentrated by using a standard rotary vacuum evaporator. Gelatinous capsules were filled with 500 mg of this aqueous extract of green tea. Identical capsules were filled with lactose and served as placebo. Patients were randomly provided with 40 packs containing 90 capsules (drug or placebo) and asked to consume three capsules per day for one month (30 consecutive days).

Noninflamed, inflamed and total facial acne lesions were counted at baseline, on week 2 and at the endpoint. Patients were not allowed to use any anti-acne medication within the study period. Eighteen patients in the case group and 16 patients in the placebo group completed this study.

Statistical analysis: The SPSS software version 16.0 (SPSS Inc., IL, USA) was used. Statistical tests were the chi-square test independent samples t-tests and Repeated Measures Analysis (RMA). The p-values ≤ 0.05 were considered as significant.

RESULTS

In case group, there were 9 males (50%) and 9 females (50%) with a mean age of 14.3 ± 1.8 years (range: 12-17). In control group, there were 11 males (68.8%) and 5 females (31.3%) with a mean age of 13.4 ± 1.3 years (range: 12-16). The two groups were comparable sex ($p = 0.27$) and gender ($p = 0.11$). The mean duration of the disease was 1.8 ± 0.6 years (range: 1-3) in case group and 1.9 ± 0.7 years (range: 1-3) in control group ($p = 0.86$). The mean numbers of facial acne lesions in the two groups at different interval are set out in Table 1.

Changes in the number of these lesions are shown in Table 1. Based on the results of RMA, changes in the mean number of noninflamed lesions during the study period Table 1 were similar between the two groups ($p = 0.33$).

In contrast, the mean number of inflamed and total lesions decreased significantly more in the case group than in the control group ($p = 0.001$ and 0.01 , respectively). The patients in the case group reported no significant complications/side effects.

Table 1: Mean facial acne lesions at baseline, on week 2 and at endpoint in two groups receiving either aqueous extract of green tea (cases) or placebo (controls)

Lesion/Time	Case (n = 18)		Control (n = 16)	
	Mean	Range	Mean	Range
Noninflamed				
Baseline	21.0±5.1	14-30	20.4±4.8	14-29
2 week	17.9±3.8	12-24	19.6±4.2	13-27
Endpoint	15.9±4.4	10-28	20.4±4.6	12-27
Inflamed				
Baseline	23.3±2.9	18-28	24.5±5.3	17-36
2 week	19.5±2.6	15-24	23.9±5.0	18-36
Endpoint	16.6±2.4	13-22	24.1±4.9	18-36
Total				
Baseline	44.3±5.4	37-53	44.9±8.3	33-63
2 week	37.4±4.6	30-45	43.5±7.4	32-59
Endpoint	32.5±5.7	24-50	44.5±8.0	32-61

Data is presented as Mean±Standard deviation

DISCUSSION

In the present study, the anti-acne effect of oral green tea extract was examined in a group of volunteers with mild-to-moderate acne vulgaris. According to these findings, while consumption of green tea extract had no significant effect on noninflamed lesion count, it significantly decreased inflamed and total lesion counts when compared to controls. The effect of green tea on acne vulgaris lesion is not new in the literature.

In a study by Elsaie *et al.* (2009), the efficacy of 2% green tea lotion was investigated in patients with mild-to-moderate acne vulgaris. In conformity with our findings, this study also showed that the lotion was effective against acne lesions. In a literature review, Pazyar *et al.* (2012) also concluded that topical green tea extract was effective against acne vulgaris.

Yoon *et al.* (2013) also showed that EGCG, the principal polyphenol in green tea was effective against acne lesions in an 8-week, randomized, clinical trial. Anti-acne effect of green tea may be attributed to its anti-bacterial, anti-oxidant and anti-inflammatory properties (Fowler *et al.*, 2010; Azimi *et al.*, 2012).

Lee *et al.* (2009) showed that green tea extract is active against Propionibacterium acne, possibly due to the presence of especial carbohydrates with anti-microbial properties. This anti-bacterial property of green tea extract was also confirmed in other studies (Taylor *et al.*, 2005; Jung *et al.*, 2012; Yoon *et al.*, 2013; Fisk *et al.*, 2014).

In addition, Mahmood *et al.* (2010) suggested that green tea decreases sebum production, an important factor in development of acne lesions. This anti-sebum property is believed to be due to gallates and α -linoleic acid in this plant that acts against 5 α -reductase.

The anti-oxidant property of green tea has been attributed to flavonoid compounds with phenolic structures. These compounds neutralize biologic macromolecules and reactive oxygen species that play a role in the pathogenesis of acne vulgaris (Hsu, 2005).

The novelty of this present study is that the green tea extract was used orally. The positive findings in this study repudiate previous reports claiming oral administration of green tea cannot provide sufficient skin protection because the human dermis acts as a strong barrier against this preparation (Dvorakova *et al.*, 1999; Stratton *et al.*, 2000; Chung *et al.*, 2003; Amirnia *et al.*, 2012; Baharivand *et al.*, 2013).

According to our findings, however, oral administration of green tea extract is effective against inflamed and total acne lesion and it can be used as a safe, well-tolerated botanical treatment in patients with mild-to-moderate acne vulgaris. Further studies using various dosages and longer follow-ups, however, are suggested (Fattahi *et al.*, 2011; Navali *et al.*, 2011; Shakeri *et al.*, 2011a, b; Feiz *et al.*, 2012; Tarzamni *et al.*, 2012; Daghighi *et al.*, 2014; Pouriesa *et al.*, 2013; Sabeti *et al.*, 2013).

CONCLUSION

Oral aqueous extract of green tea is effective against acne lesions in patients with mild-to-moderate disease.

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