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## Efficacy of bipolar radiofrequency on treatment of acne vulgaris

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### ABSTRACT

**Background:** Acne vulgaris is a common chronic skin disease involving blockage and/or inflammation of pilosebaceous units (hair follicles and their accompanying sebaceous gland). Acne can present as noninflammatory lesions, inflammatory lesions, or a mixture of both, affecting mostly the face but also the back and chest. **The Purpose:** of this study was to investigate the effect of bipolar radiofrequency on treatment of acne vulgaris. **Material and Methods:** Thirty patients suffer from inflammatory acne vulgaris with grade II to grade IV on acne global severity scale selected randomly from Outpatient Clinic, Shobra El Khema, Qalubia, Egypt. Their ages ranged from 18- 25 years. They assigned into two groups equal in number: Group (I)(Study group):15 patients received bipolar radiofrequency twice/week for one month plus medications (Salicylic acid soap) twice/day, Group (II)(Control group):15 patients received medications (Salicylic acid soap) twice/day only for one month. Acne global severity scale and digital camera were used to evaluate acne degree before and after the study. **Results:** There was significant improving in inflammatory acne in study group(I) compared to the control group(II). **Conclusion:** Bipolar radiofrequency is useful and safe approach in treatment of inflammatory acne vulgaris and improving cosmetic appearance.

**Key words:** Bipolar radiofrequency, Acne vulgaris.

## INTRODUCTION

Acne vulgaris is a common chronic skin disease involving blockage and/or inflammation of pilosebaceous units (hair follicles and their accompanying sebaceous gland. Acne can present as noninflammatory lesions, inflammatory lesions, or a mixture of both, affecting mostly the face but also the back and chest (1).

Genetics is thought to be the cause in 80% of cases. The role of diet and cigarette smoking is unclear and neither cleanliness nor sunlight appear to be involved. Acne primarily affects skin with a greater number of oil glands, including the face, upper part of the chest, and back. During puberty, in both sexes, acne is often brought on by an increase in androgens such as testosterone. Excessive growth of the bacteria *Propionibacterium acnes*, which is normally present on the skin, is often involved(2).

Acne vulgaris is characterized by noninflammatory, open or closed comedones and by inflammatory papules, pustules, and nodules. Acne vulgaris affects the areas of skin with the greatest proportion of sebaceous follicles (3).

Radiofrequency is a new non surgical device that use a variety of energy source for treatment of acne vulgaris perhaps by shrinking sebaceous glands; and photodynamic therapy with topical agents (4).

Radiofrequency is a rate of oscillation in the range of about 3 kHz to 300 GHz, which corresponds to the frequency of radio waves, and the alternating currents which carry radio signals and it usually refers to electrical rather than mechanical oscillations (5).

There is initial collagen contraction and destruction through both mechanical and biochemical pathway. As a result of delivered energy of radiofrequency into the skin, collagen remodeling through a controlled wound healing response occurs over time with associated neocollagenesis. This collagen remodeling also yield the associated tissue tightening that is seen with this device (6).

## Materials And Methods

### **1-subjects:**

Thirty patients who have inflammatory acne vulgaris from grade (II) to grade (IV).of both sexes were participated in this study . They were selected randomly from private outpatient clinic, Cairo, EgyptThe patient were randomly divided into two groups: **Group I** (study group): This group was composed of 15 patients (7 males and 8 females) and received bipolar RF therapy two sessions per week plus medication (salicylic acid soap) twice/day for four weeks. **Group II** (control group) This group was composed of 15 patients (6 males and 9 females) and received only medication (salicylic acid soap) twice/day for one month.

**Ethical Consideration:**

The purpose, nature and potential risks of the study were explained to all patients, and a consent form was taken from all participant as an agreement to be included in the present research study. The study was reviewed and approved by Ethical Committee of faculty of Physical Therapy, Cairo University.

**Inclusive criteria:**

The patient's ages ranging from 18 to 25 years old. They were chosen of both sexes. Patients with inflammatory acne vulgaris from grade (II) to grade (IV) according to acne global severity scale in one or more of the following areas in face (forehead, cheeks and chin) only. All patients in the two groups received the same medication (salicylic acid soap).

**Exclusive criteria:**

- Any patient had one or more of the following was excluded from the study;
- Patients with implanted pacemakers or defibrillators.
  - Patients with facial implants.
  - Indications of increased photosensitivity, collagen-vascular disease, diabetes, cardiac insufficiency, a history of skin cancer.
  - Pregnancy.
  - Patients with active local or systemic infections.
  - Smoking patients or alcohol drinkers.
  - Patients who have any diseases can affect the normal healing process (anemia and diabetes).
  - Patients with psychological problems.
  - Patients with dermatological condition in the treated area rather than acne vulgaris.

**2-Materials:**

The equipments used divided into therapeutic and measuring equipment:

**A) Measuring equipment:**

Acne global severity scale is a universal scale used to evaluate the degree of acne vulgaris. The grade of inflammatory acne was determined before the beginning of the treatment (pre), and after the end of treatment (post)(7) and photographic picture was taken to every patient before the beginning of the treatment and after the end of the treatment(8).

**B) Therapeutic Equipments:**

**Bipolar Radiofrequency device:**

This apparatus used to administrate radiofrequency waves on acne vulgaris. It is CWM900, RAFOS, using dual 0.3MHz and 0.5MHz RF energy depending on applied areas. In addition, infrared thermal sensors equipped into the handle shown skin temperature degree and operate the device more safely. This equipment with adjustable timer from 1 to 60 min and power consumption 350w.

### 3)Methods:

**Evaluative procedures** Medical examination was carried out to determine the possibility of the patient to be included in the study by dermatologist before starting the study. All information about the study was given to patients before the beginning. Every patient was given his/her written consent before the beginning of the study. All patients were asked to stop any oral medication before the study at least 3 weeks and topical medication at least 2 weeks rather than included in the study. Patients who didn't complete the procedure of the study were excluded. Patients were asked to avoid prolonged exposure to sun light, friction or squeezing acne lesion. Female patients were asked to avoid putting make up during the treatment period..

**Therapeutic procedures** The patient was placed in comfortable position. The patient was asked to wash the treated areas and clean it with a mild cleanser. The areas to be treated were lubricated with Lavatron (high frequency face cream) which contain natural oil to facilitate easy movement of the head and protect the skin from harmful environmental elements while improving the tonicity and elasticity of the skin. The patient received bipolar RF at average energy 160-180 W, main power 50-60 Hz, RF output 0.3&0.5 MHz, 50mm electrode size (twice/week) for one month. The RF electrode was moved quickly in random fashion over each area for 30 sec. The technique takes only 5 minutes in one cheek. If the forehead and other cheek are also treated, total treatment time was increased to 15 minutes. If there was marked erythema, ice was applied until skin temperature decreased.

### RESULTS:

**Subjects Characteristics:** As shown in **table(1)** Thirty patients with inflammatory acne vulgaris, the patients were randomly divided into two groups: **Group I** (study group): 15 patients (7 males and 8 females), **Group II** (control group) 15 patients (6 males and 9 females) the mean value and SD for their age were (21.2 ±2.366) ,(21.533 ±1.726) years respectively, There was no significant difference between two groups in their mean age, where P-values were (0.663).

**Table (1): General characteristics of subjects**

General characteristics		Age (yrs)
<b>Group I</b> <b>I Study group</b>	<b>Mean ±SD</b>	21.2 ±2.366
<b>Group II</b> <b>Control group</b>	<b>Mean ±SD</b>	21.533 ±1.726
<b>Comparison</b>	<b>t-value</b>	0.441
	<b>P-value</b>	0.663

Significance	Non significant
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**Comparison of pre and post study for group I and group II::**

As shown in table (2), the mean values and SD of acne grade for group I before and after the study were (3 ±0.755) and (1.466 ±0.915) respectively. There was significant difference between pre and post-study in grade of acne, where P-values were (0.000). The mean values and SD of acne grade for group II before and after the study were (3.06 ±0.883) and (2.733 ±1.22) respectively. There was significant difference between pre and post-study in grade of acne, where P-values were (0.019).

**Table (2): Pre and Post study values of grade of acne in both groups:**

		Pre-study mean ± SD	Post-study mean ± SD	t- value	P- value	Significance level
Grade of acne on acne global severity scale	Group I Study group	3 ±0.755	1.466 ±0.915	11.5	0.000	significant
	Group II Control group	3.06 ±0.883	2.733 ±1.22	2.64	0.019	significant

**SD: standard deviation, P: probability**

Figure(1) and figure (2) show Pre-study and post-study mean value of grade of acne in group I (Study group) and group II (Control group)

**Figure (1): Pre-study and post-study mean value of grade of acne in group I (Study group)**

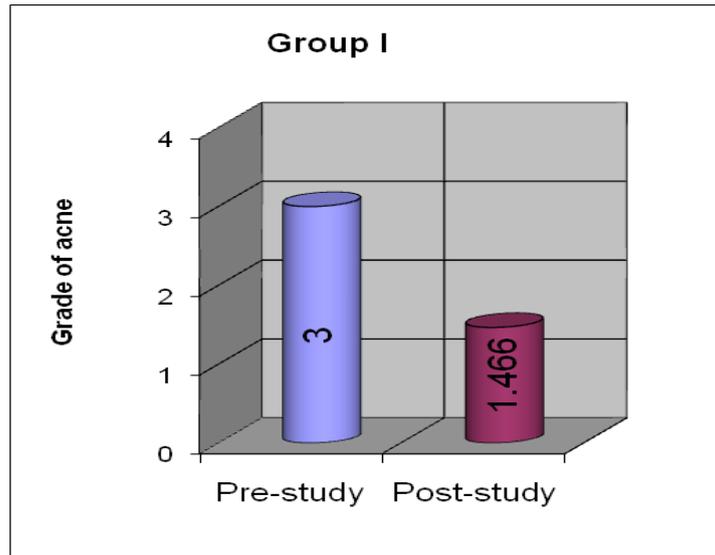
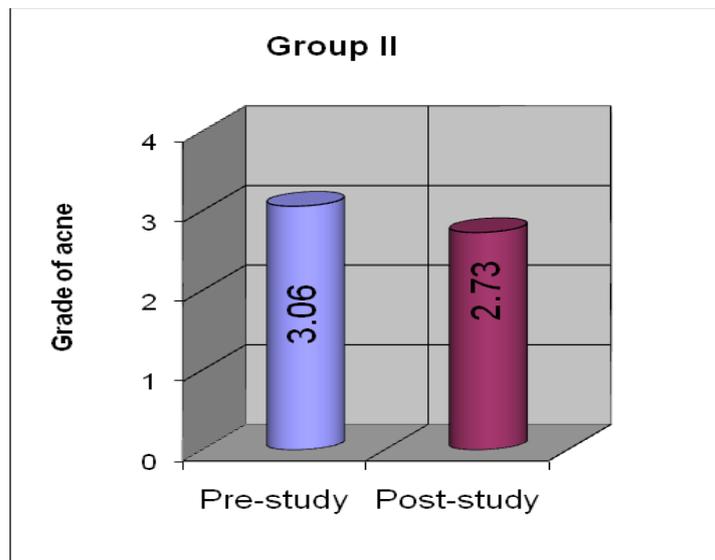


Figure (2): Pre-study and post-study mean value of grade of acne in group II (Control group)



### Discussion

This study was conducted to evaluate the efficacy of bipolar radiofrequency therapy on improvement of inflammatory acne vulgaris by using two various methods of evaluation (Acne global severity scale and photographic pictures by digital camera). After 4 weeks of treatment there was significant improvement in both groups in favor to group I than group II

Sang et al .,(9): preformed the study on eighteen patients (15 male, 3 female; mean age 27, range: 19–33; Fitzpatrick skin type IV with moderate to severe acne

vulgaris who were treated with two sessions of fractionated microneedle RF at 1-month intervals were enrolled in this study. Evaluation of improvement, which took into account number of inflammatory acne lesions, showed that two of the 18 patients had grade 4 clinical improvement, eight had grade 3 improvement, and six had grade 2 improvement. Improvement scores in terms of lesion severity were also evaluated. One of the 18 patients had grade 4 clinical improvement, eight grade 3, and seven grade 2. No patient had worsening of inflammatory acne lesions. They concluded that Fractionated microneedle RF can have a positive therapeutic effect on inflammatory acne vulgaris and related scars. In addition, this technique does not worsen active acne lesions.

**Ganesh et al., (10):** aimed to determine the efficacy and safety of using non-insulated penetrating microneedles to deliver bipolar RF energy for treating acne vulgaris and acne scars. Improvement in moderate to severe acne vulgaris and mild to severe acne scarring was evaluated in 316 patients (195 males and 121 females; ages ranging from 18-34 years; Fitzpatrick skin types IV-V) treated with two to four sessions of bipolar non-insulated microneedle treatment RF. At two months after the final bipolar RF treatment, clinical assessment revealed grade (1) improvement in 21 (6.6%) of the 316 patients, grade (2) improvement in 78 (24.7%), grade (3) improvement in 133 (42.1%), and grade (4) improvement in 84 (26.6%). Temporary aggravation of acne vulgaris or folliculitis, which spontaneously resolved within three weeks, was noted in 9 patients. Otherwise, no remarkable side effects were recorded. The results suggested that bipolar non-insulated microneedle RF treatment can be effectively and safely used to treat acne vulgaris and acne scars in patients with Fitzpatrick skin type IV-V.

**Victor G et al.,(11):** performed a study at thirty-two patients with moderate acne were treated twice weekly for four weeks; combination of pulsed light and RF energy. Twenty-five patients completed the study. In four patients, the number of hair follicles showing perifolliculitis, the diameters of hair follicles, the diameters of sebaceous glands, and expressions of heat shock protein 70 and procollagen-1 were evaluated before and after treatment. The mean lesion count was reduced by 47% ( $p < 0.05$ ) after eight treatments. Adverse effects erythema, tingling, and burning were mild and temporary. The percentage of follicles with perifolliculitis decreased from 58% to 33%, sebaceous gland areas decreased from  $0.092 \text{ mm}^2$  to  $0.07 \text{ mm}^2$ , and heat shock protein 70 and procollagen-1 expressions did not change. The combination of optical and RF energies may be an alternative nonablative modality for the treatment of moderate acne. Clinical improvement may be partly due to reductions in both perifollicular inflammation and sebaceous gland areas.

**Chi K et al.,(12):** performed a case report to evaluate the efficacy of combined fractional radiofrequency and fractional laser treatment for acne scars in Asians. Twenty-four patients (skin types III and IV) with acne scars received up to five treatments of combined fractional 915-nm laser and bipolar RF using a Matrix IR

applicator (Syneron Medical Ltd, Yokneam, Israel) with fluence ranging from 50 to 70 J/cm<sup>2</sup>, RF at 70–100 J/cm<sup>3</sup>, double passes followed by full-face bipolar fractional RF treatment using Matrix RF at energy ranging from 50 to 62 mJ/pin, at 4-week intervals. Changes in acne scars, skin texture, pore size, pigmentation irregularity, and complications were assessed up to 3 months post-treatment by standardized photographs obtained with Canfield Visia-CR system. Subjective improvement and patient satisfaction were assessed by questionnaire. Twenty patients (age 27.7 ± 8.4 years) completed the study. Modest but statistically significant improvement was noted in acne scars, with the mean grade decreased by 29% ( $P < 0.001$ ), and 52% were rated with at least moderate objective global improvement at 3 months. Mean pain score was 2.6 on a scale of 0–4. There were also objective improvements in all secondary endpoints. Post-inflammatory hyperpigmentation (PIH) occurred mainly over bony areas in 6.5% of all treatments. Subjective improvement was moderate to significant for 36.8% of patients, and 63% reported being satisfied with the treatment results at 3 months despite considerable pain level. They concluded that use of fractional laser with RF followed by fractional RF was shown to be safe and effective for acne scars with modest improvement and low PIH rate comparable to other resurfacing techniques in this Asian case series. Adequate pain control and reduced energy level when treating areas in close proximity to bone are advised.

### **Conclusion**

It can be concluded that bipolar radiofrequency is safe, effective, and available way on treatment procedure to control inflammatory acne vulgaris.

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#### تأثير موجات الراديو ثنائية التردد على علاج حب الشباب

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#### المستخلص العربي

هدف الرسالة: هو دراسة تأثير موجات الراديو ثنائية التردد على علاج حب الشباب. الأشخاص: ثلاثون مريضا من الذكور و 17 من الإناث تم اختيارهم عشوائيا من عيادة خارجية بشبرا الخيمة، القليوبية، مصر. وتم تقسيمهم إلى مجموعتين متساويتين في العدد. وتراوحت أعمارهم من 18 إلى 25 عاما. المجموعة (1) بمتوسط عمر (21.2 ± 2.366) سنة، ومجموعة (2) بمتوسط عمر (21.533 ± 1.726) سنة. طريقة البحث: تم استخدام المقياس العالمي لتقييم شدة حب الشباب والكاميرا الرقمية لتقييم درجة حب الشباب قبل وبعد الدراسة. المجموعة (1): 15 مريضا يعانون من حب الشباب من الدرجة الثانية الي الدرجة الرابعة تعال مع مقياس العالمي لتقييم شدة حب الشباب تلقوا موجات الراديو ثنائية التردد التردد مرتين / الأسبوع لمدة شهر واحد مع (صابون حمض السلسيليك) مرتين / يوم، ا لمجموعة (2): 15 مريضا يعانون من حب الشباب من الدرجة الثانية الي الدرجة الرابعة تعال مع مقياس العالمي لتقييم شدة حب الشباب تلقوا (صابون حمض السلسيليك) مرتين / يوم فقط لمدة شهر واحد. النتائج: كان هناك تحسن كبير في التهاب حب الشباب في مجموعة (1) مقارنة مع مجموعة (2). وذلك تبعا على للمقياس العالمي لتقييم شدة حب الشباب وتقييم التصوير الفوتوغرافي. الخلاصة: موجات الراديو ثنائية التردد ا هو نهج مفيد وآمن في علاج حب الشباب وتحسين المظهر الجمالي .