

ORIGINAL RESEARCH REPORT

## An alternative treatment modality for cellulite: LPG endermologie

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### Abstract

**Background:** LPG endermologie is a worldwide FDA-approved massage system used in the treatment of cellulite. **Objective:** The aim of this study is to evaluate safety, efficacy, and the slimming potential of LPG endermologie. **Material and methods:** A total of 118 women (mean age,  $34.59 \pm 8.02$  years) were enrolled in this study. The LPG treatment sessions were performed twice weekly and continued for at least 15 sessions. The outcome was clinically evaluated using digital photography for cellulite grade assessment while perimetric measurements for eight body sites were performed. The evaluation also included measurements of body weight and body fat percentage (BFP). **Results:** One hundred and seventeen patients (99%) showed loss in body circumference measurements. A mean body circumference reduction of  $2.9 \pm 1.6$  cm was obtained per site for all patients. There was a mean body circumference loss which was statically significant with  $p < 0.001$ . Weight loss was detected in one hundred and three patients (87%). The mean body weight loss was  $2.717 \pm 1.938$  kg for all patients. One hundred and ten subjects (93%) also showed decreases in BFP. The questionnaire indicated high satisfaction in 81 (69%) patients. **Conclusion:** LPG endermologie is a well-tolerated and effective alternative treatment modality for slimming and body contouring.

**Key Words:** body contour, cosmetic dermatology, LPG endermologie, slimming

### Introduction

Cellulite is a widespread phenomenon that gives the skin an orange-peel appearance which is particularly found on the thighs and buttocks of post-adolescent women (1). It is also present even in most of the fit women (1,2). Besides no consensus on the etiology of cellulite, there are debates on its treatment methods which, most of the time, lack scientific evidence of efficacy such as liposuction (3), mesotherapy (4), subcision (5), topical creams (2), and carboxytherapy (6).

LPG endermologie is a FDA-approved, non-invasive mechanical massage technique for the treatment of cellulite; however, its scientific evidence level is at Grade 2 with at least one controlled study without randomization (2). LPG endermologie consists of a deep tissue mobilization provided by a medical device composed of a treatment chamber with an aspiration system and two independent motorized rollers that roll and unroll skin folds (1). The positive

pressure from the rollers combined with the negative pressure from aspiration is believed to cause sub-lethal damage to the subcutaneous fat cells. As these damaged fat cells heal, they rebuild with an improved contour of the skin and a better distribution of subcutaneous fat as a result. Although the fat layer is altered, this mechanical force does not affect the overlying skin, bones, or muscles (7).

In this study, we aimed to investigate the efficacy of LPG endermologie treatment in women with cellulites. As we know, our study is the largest sample in regard to the literature.

### Materials and methods

#### Participants

One hundred and eighteen women seeking cellulite treatment and slimming were enrolled in this study

Table I. Changes in cellulite grades with LPG treatment<sup>‡</sup>.

	Pre-treatment n (%)	Post-treatment n (%)	
Grade 0	0	0	$X^2 = 51.70$ $p < 0.0001^{**}$
Grade 1	4 (3.4)	55 (46.6)	
Grade 2	95 (80.5)	56 (47.5)	
Grade 3	19 (16.1)	7 (5.9)	

<sup>‡</sup>Chi-square test was used; <sup>\*\*</sup>statistically significant.

(age range, 19–63 years with a mean age of  $34.59 \pm 8.02$  years). The cellulite Grades 0–3 based on the four-stage Nurnberger–Muller scale-1978 (8) were as follows: 0, no alterations on skin; 1, orange peel appearance of the skin by pinch test or muscle contraction; 2, orange peel appearance at rest; and 3, orange peel appearance at rest plus raised areas and/or nodules. Exclusion criteria were pregnancy, concomitant cellulite treatments, inflammatory or infectious skin diseases in the concerned areas, severe heart failure, malignancy, severe varicose veins on the lower extremities, and a history of deep venous thromboses. All patients were given and signed a written informed consent prior to the participation in the study.

### Procedure

Each patient was treated with the LPG endermologie unit (LPG Cellu M6 Keymodule® France) by the same well-trained LPG technician. Each session lasts for about 35–40 min. Treatment sessions were performed weekly twice for at least 15 sessions per patient. During the procedure, a special LPG suit was given to each patient to cover their body except their face, neck, hands, and feet regions. Treatment was given to the patients from neck to ankle when they lied in the prone and supine positions. Lastly, by lying on each side, lateral and medial parts of the patients' legs were massaged. In addition, the weight and the body fat percentages (BFPs) were analyzed using Gaia 359 Plus™ (Body composition analyzer, Jawon Medical, Kyungsan-City, Korea).

### Treatment assessment

Cellulite grading and treatment assessment were performed by analyzing the photographs of the hips and thighs taken before and after the treatment.

The improvement was assessed at the end of the study by a blind dermatologist by comparing the pre- and post-treatment photograph pairs according to the Nurnberger–Muller cellulite scale score. The initial and post-treatment circumferential thickness measurements of eight body sites (i.e., arm, waist, abdomen, hip, subgluteal region, thigh, knee and calf), the weight, and the BFPs were recorded. Perimetric circumferential thickness measurements of eight body sites were obtained before the application and 15 days after the treatment. Measurements were taken at a specific and consistent distance from an anatomic bony landmark to assure a consistent location. The total and mean body circumference changes were calculated. As a result, a mean loss in the body circumference was determined for each treated body site, and these eight parameters were then calculated into a mean index of overall average loss. The tolerability and efficacy of the treatment were assessed subjectively in the patients with a questionnaire-based response. On each visit, the patients were also monitored for any adverse effects of the treatment.

### Statistical analyses

Data are presented as means  $\pm$  SD. The paired samples t-test was used for comparing baseline and post-treatment mean values of perimetric circumferential thicknesses. The chi-square test was used for comparing pre-treatment and post-treatment cellulite grades. A value of  $p < 0.05$  was accepted as statistically significant.

### Results

When we looked at the pre-treatment cellulite assessments, 95 (80.5%) patients were in cellulite Grade 2, 19 (16.1%) patients in Grade 3, while only 4 (3.4%) were in Grade 1 according to Nurnberger–Muller scale. The improvement achieved after the LPG treatment was found to be statistically significant ( $X^2 = 51.70$ ,  $p < 0.0001$ ) when compared to the initial cellulite grade. Twelve (63%) of the patients who were in Grade 3 were improved to Grade 2 and 51 (54%) of patients in Grade 2 were improved to Grade 1. However, there was no improvement detected in the patients who are in Grade 1 (Table I).

Table II. Changes in weight, BFP, and mean body circumference rate<sup>‡</sup>.

	Pre-treatment (mean $\pm$ SD)	Post-treatment (mean $\pm$ SD)	Mean loss (mean $\pm$ SD)	P
Weight	64.5 $\pm$ 6.7	61.8 $\pm$ 6.7	2.7 $\pm$ 1.9	$p < 0.0001^{**}$
BFP	28.4 $\pm$ 2.5	27.3 $\pm$ 2.4	1.1 $\pm$ 0.7	$p < 0.0001^{**}$
Mean body circumference loss	67.8 $\pm$ 5.4	64.8 $\pm$ 5.2	2.9 $\pm$ 1.6	$p < 0.0001^{**}$

<sup>‡</sup>Paired sample t-test was used; <sup>\*\*</sup>statistically significant.

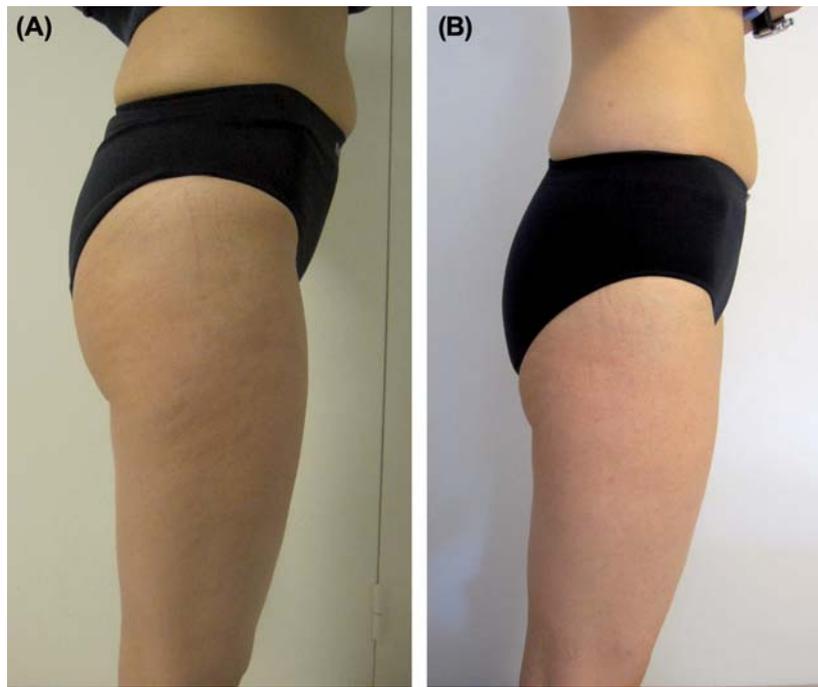


Figure 1. Prominent body circumference reduction is seen before (A) and after (B) treatment.

One hundred and seventeen patients (99%) showed an overall average body circumference reduction. A mean body circumference reduction of  $2.9 \pm 1.6$  cm was achieved in all subjects (Table II) (Figure 1). The mean body circumference losses were statistically significant with  $p < 0.001$  for each measured body site (i.e., abdomen, arm, knee, hip, calf, waist, and subgluteal, thigh). A maximum mean body circumference reduction was detected in the hips, whereas a minimum loss was seen in the calves (Table III). After LPG treatment sessions, there was a significant weight reduction in most of the patients ( $64.55 \pm 6.75$  kg vs.  $61.83 \pm 6.75$  kg with  $p < 0.0001$ ). However, while 103 (87%) patients had a weight loss ( $3.296$  kg  $\pm$   $1.295$  kg), 15 (13%) patients had weight gain ( $1.250$  kg  $\pm$   $0.750$  kg). In addition, a statistically significant reduction in BFP was seen after LPG treatment ( $28.45 \pm 2.50$  vs.  $27.36 \pm 2.44$ ,  $p < 0.0001$ ) (Table II).

Regarding the level of satisfaction with the effectiveness of LPG, all of the patients answered for a questionnaire (Table IV). In terms of the subjective

scales regarding the efficacy of LPG, most of the patients expressed positive thoughts about LPG (Figure 2). But five patients (4%; one patient from Grade 2 and four patients from Grade 3) were not satisfied with the cosmetic outcome of this therapy. Highly satisfied patients were Grade 2 cellu- litic subjects with a ratio of 59% (70 patients) (Figure 3). The questionnaire indicated a high patient satisfaction (81 patients, 69%). No patient showed irregularities, bruising, new telangiectasia formation, dimples, or any serious side effects after the treatment.

## Discussion

Cellulite is a common aesthetic problem that mostly affects the buttocks and thighs of post-pubertal women. Despite its popularity and the variety of treatment choices, the efficacy of the treatments approved by FDA is dissatisfying. In this study, we obtained a significant improvement in cellulite grade after 15 sessions of LPG treatment and the reduction of cellulite

Table III. Mean body circumference loss of each body area after LPG treatment<sup>†</sup>.

Body areas	Pre-treatment (mean $\pm$ SD, cm)	Post-treatment (mean $\pm$ SD, cm)	Mean loss (mean $\pm$ SD, cm)	P
Arm	29.5 $\pm$ 2.5	27.6 $\pm$ 2.7	1.8 $\pm$ 1.3	<0.0001**
Knee	40.3 $\pm$ 3.2	38.5 $\pm$ 3.0	1.8 $\pm$ 1.0	<0.0001**
Calf	50.4 $\pm$ 3.8	48.5 $\pm$ 3.8	1.8 $\pm$ 1.0	<0.0001**
Thigh	58.1 $\pm$ 5.0	55.5 $\pm$ 4.9	2.7 $\pm$ 1.3	<0.0001**
Waist	79.5 $\pm$ 8.0	76.0 $\pm$ 7.3	3.5 $\pm$ 1.9	<0.0001**
Abdomen	89.5 $\pm$ 8.2	85.8 $\pm$ 7.4	3.7 $\pm$ 2.2	<0.0001**
Subgluteal	93.8 $\pm$ 7.4	90.1 $\pm$ 6.9	3.7 $\pm$ 1.7	<0.0001**
Hip	101.1 $\pm$ 5.4	96.8 $\pm$ 5.3	4.2 $\pm$ 2.1	<0.0001**

<sup>†</sup>Paired sample *t*-test was used; \*\*statistically significant.

Table IV. Patient satisfaction questionnaire results.

Groups	N	Average satisfaction score		
		Not satisfied	Somewhat satisfied	Highly satisfied
Grade 1	4	0	0	4 patients (3%)
Grade 2	95	1 patients (1%)	24 patients (20%)	70 patients (59%)
Grade 3	19	4 patients (3%)	8 patients (7%)	7 patients (6%)
Total	118	5 patients (4%)	32 patients (27%)	81 patients (69%)

was achieved in 63 (53%) of 118 participants. In previous studies performed by Ersek in 1997 and 1998 (7,9), LPG was found to be efficient in five body sites (waist, hips, thighs, knee, and calves). However, in those studies, more than half of the patients did not complete the 15-session schedule of LPG. In a recent study carried out by Guleç (1), LPG was found to be efficient in cellulite reduction in eight body sites in terms of body circumference measurements. In these previous studies, the main limitation was the relatively small sample sizes, thus; our study is considered to have the largest sample size in literature about LPG and in which all of the patients had completed all the 15 treatment sessions.

The other differences that distinguished this study from the previous ones were in performing a worldwide accepted cellulite grade and adding another three additional body sites (arm, breast, and subgluteal regions) for body circumference measurements. Thus, the findings of this study supported the conclusions obtained from the reduction in body circumference measurements and improvement in cellulite grading regarding the studies on LPG. Moreover, based on the evidence obtained from the previous studies, except for one patient, we also detected the reduction in body circumference measurements even in 14 (12%) patients who gained weight during the study. Furthermore, this study is considered to be the first to measure BFP in



Figure 2. Cellulite improvement and tightening before (A, C, E) and after (B, D, F) photographs of the same patient.



Figure 3. One of highly satisfied patients, before (A) and after (B).

which we obtained a significant reduction. Interestingly, when looking at the results obtained from both ours and the study carried out by Guleç, we noticed that there was no improvement after LPG treatment sessions in patients with Grade 1 cellulite, although this finding has not been mentioned or emphasized in other LPG studies. Thus, further studies of LPG in patients with Grade 1 cellulite seem to be needed in order to contribute the debate of efficacy of LPG in patients with early stage of cellulite.

When reviewing the literature, we found that only one study which compared other treatment modalities of cellulite with LPG. In that study, no significant differences between LPG, aminophylline and LPG plus aminophylline treatments were found in terms of efficacy. The authors concluded that all treatment approaches were effective in treating cellulite. In a recently published study (10), the phosphatidylcholine/deoxycholic acid, caffeine, and organic silicon mesotherapy treatments were found effective in treating cellulite in which phosphatidylcholine/deoxycholic acid was the most effective one.

The scientific evidence of LPG in the literature is inconclusive and has only level-II evidence strength (at least one controlled study without randomization). Thus, comparing other treatment modalities such as mesotherapy, carboxytherapy, radiofrequency, and ultrasound should enhance the knowledge of clinicians on the efficiency of LPG treatment on cellulite.

Still, our study has some limitations. The lack of more valid methods for the measurement of cellulite grading (i.e., ultrasonography or magnetic resonance imaging) is the first one. The lack of excisional skin biopsies containing subcutaneous tissue that enable us in terms of determination of the degree of fat loss and cellulite reduction is a second limitation. So we believe that more comparative studies of LPG would be more informative.

As a conclusion, LPG endermologie seems to be an effective, well-tolerated and satisfying non-invasive technique for reducing cellulite grade, BFP, and body circumference measurements.

**Declaration of interest:** The authors report no declarations of interest. The authors alone are responsible for the content and writing of the paper.

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