

**The Effectiveness of Castor Oil for Enhancing Eyelashes;  
A Randomized, Double-Blind, Placebo-Controlled Trial**

การศึกษาประสิทธิภาพการกระตุ้นการเติบโตของขนตาด้วยน้ำมันละหุ่ง แบบสุ่มและปกปิดสอง  
ทางเทียบกับยาหลอก

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**Abstract**

Eyelashes not only meant to serve natural protective barrier for the eyes but also be a symbol of beauty and attractiveness. Castor oil is found to be effective in growing eyelashes. We hypothesized that castor oil can be used to stimulate thickness and length of eyelash. The objectives of this study were to study the effectiveness of Castor oil on eyelash length. To study the effectiveness of Castor oil for improving the eyelash thickness.

11 volunteers, aged 20-40 were randomly split face. Castor oil treatment was applied on one side of eyelash and placebo on another side of eyelash for 12 weeks. Folliscope was used to measure in thickness of eyelash on medial side of eyelash. Eyelash ruler was used to measure in length of hair on lateral side of eyelash and eyelash midpoint.

The result shown thickness of eyelash was significantly increased ( $p < 0.05$ ) on midpoint, treated with castor oil treatment and placebo. Comparing the eyelash thickness found no significantly different between eyelash on the treatment side and the placebo side. The length of eyelash on lateral side and midpoint of eyelash were increased insignificantly but the result was not seen when compared between castor oil treatment and placebo.

**Keywords:** castor oil / eyelash / hypotrichosis

### บทคัดย่อ

ขนตานอกจากจะเป็นเครื่องปกป้องดวงตา อีกทั้งยังเป็นสัญลักษณ์ของความงามและดึงดูดใจ มีรายงานว่าน้ำมันละหุ่งมีประสิทธิภาพในการเพิ่มการเจริญของขนตาได้ จึงเป็นที่มาของสมมติฐาน และจุดประสงค์ของการศึกษาวิจัยนี้คือการศึกษาประสิทธิผลของน้ำมันละหุ่งต่อความยาวและความหนาของขนตา

วิธีการศึกษาโดยอาสาสมัคร 11 คน อายุ 20-40 ปี ได้รับสารทดสอบคนละ 2 หลอด คือ ทรีตเมนต์ที่มีส่วนผสมของน้ำมันละหุ่ง 35% และ ยาหลอก โดยสุ่มทาที่โคนขนตาแต่ละข้าง วันละ 1 ครั้ง ก่อนนอน เป็นเวลา 2 สัปดาห์ ติดตามผลการรักษาในสัปดาห์ที่ 4, 8 และ 12 ตามลำดับ ประเมินความหนาขนตาที่บริเวณกลางตาด้วยกล้องกำลังขยาย (Folliscope) ประเมินความยาวขนตาบริเวณหัวตาลกลางตา หางตา ด้วยไม้บรรทัดสำหรับขนตา (Eyelash Ruler) และให้ผู้เข้าร่วม โครงการประเมินความพึงพอใจโดยรวมของการรักษา บันทึกผลข้างเคียงที่เกิดจากการใช้สารทดสอบแต่ละตัว

ผลการศึกษา ผู้เข้าร่วม โครงการมีความหนาขนตาที่บริเวณกลางตาเพิ่มขึ้นอย่างมีนัยสำคัญทางสถิติ ( $p < 0.05$ ) ในด้านที่ใช้คือทรีตเมนต์ที่มีส่วนผสมของน้ำมันละหุ่ง 35% และ ด้านที่ใช้ยาหลอก ความยาวขนตามีแนวโน้มเพิ่มขึ้นในด้านที่ใช้ทรีตเมนต์ที่มีส่วนผสมของน้ำมันละหุ่ง

35% และเมื่อเปรียบเทียบระหว่างการใช้คือทรีตเมนต์ที่มีส่วนผสมของน้ำมันละหุ่ง 35% และ ยา หลอก พบว่าความหนาของขนตาบริเวณกลางตา และ ความยาวของขนตาบริเวณหัวตา กลางตา และ หางตา ไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ

**คำสำคัญ:** น้ำมันละหุ่ง/ ขนตา/ ภาวะขนตาบาง

## **Introduction**

Eyelashes meant to serve natural protective barrier for the eyes from the sunshine, the wind, foreign bodies, and perspiration. They are susceptible to the touch and provide a warning when an object is near the eye, which in turn prompts the eye to close reflexively. Eyelash hypotrichosis is a condition of abnormal hair loss or reduction. (Simon, 2010). Many women do not have the eyelashes hypotrichosis condition. They desire to have longer and thicker eyelashes because of the long eyelashes have always been a symbol of beauty and attractiveness. There are many ways to increase lash length, thickness and darkness like using different types of mascara, false lashes or lash transplantation which are the unnatural and non-permanent method (Dana et al, 2015). An Effective treatment for growing or prevention of alopecia eyelash is not much available. There are two well-known drugs that approved by FDA. First, Finasteride is suitable for treating the Androgenetic alopecia by inhibiting  $5\alpha$ -reductase enzyme. Another is Minoxidil. It is improving hair growth by prolonging the anagen phase and enlarge the hair follicles. Bimatoprost solution is a synthetic prostaglandin analogs. It has been reported that can be stimulated the telogen phase to the anagen phase and also can prolong the anagen phase. Bimatoprost solution is approved for increasing the eyelash length and thickness (Murray et al, 2002). Castor oil has been reported that it contains Ricinoleic acid, the potential of hydroxylated fatty acids to specifically activate prostanoid receptors (Sorin et al, 2012). Rusu et al (2008) was done an experiment on the rabbit using the lotion contain 35% castor oil. During the 35 days of study, the fur of the

rabbits became thicker and softer, proving that the animals are still healthy. Murray and colleagues (2002) said that prostaglandin can prolong the anagen phase of the hair cycle. So it comes into the hypothesis that castor oil can be effective on hair growth.

## Objectives

1. To study the effectiveness of Castor oil on eyelash length.
2. To study the effectiveness of Castor oil for improving the eyelash thickness.

## Materials and Methods

This study was a Randomized, Double-blind, Placebo-Controlled Trail. 11 participants aged 20-40 years old with mild to moderate eyelash based on Global Eyelash Assessment had measured the eyelash length and the eyelash thickness. Folliscope was used to measure in thickness of eyelash on the midpoint of eyelash. Eyelash ruler was used to measure in length of eyelash on the inner corner, outer corner and the midpoint of eyelash line. Randomly distributed the treatment to the participants. All participants received 2 tubes of treatment. By either tube contained 35% castor oil treatment or the placebo. Each tube held “Left” or “Right” label. Participant were randomly split face. Castor oil treatment was applied on one side of eyelash and placebo on another side of eyelash followed the label on the tube for 12 weeks. In the fourth, the eighth and the twelfth week, all measurements in the first week were repeated. In the twelfth week, all participants

## Results

**Table 1** The thickness of eyelash on the treatment side at multiple times. (n=11)

|                  | <b>Week0</b> | <b>Week4</b> | <b>Week8</b> | <b>Week12</b> | <b>p-value</b> |
|------------------|--------------|--------------|--------------|---------------|----------------|
| <b>Treatment</b> | 69.45±11.22  | 68.27±10.23  | 72.45±11.73  | 74.09±11.74   | 0.033*         |
| <b>Placebo</b>   | 70±10.53     | 71.55±11.05  | 72.91±11.62  | 73.82±11.37   | <0.001*        |
| <b>p-value</b>   | 0.908        | 0.472        | 0.928        | 0.956         |                |

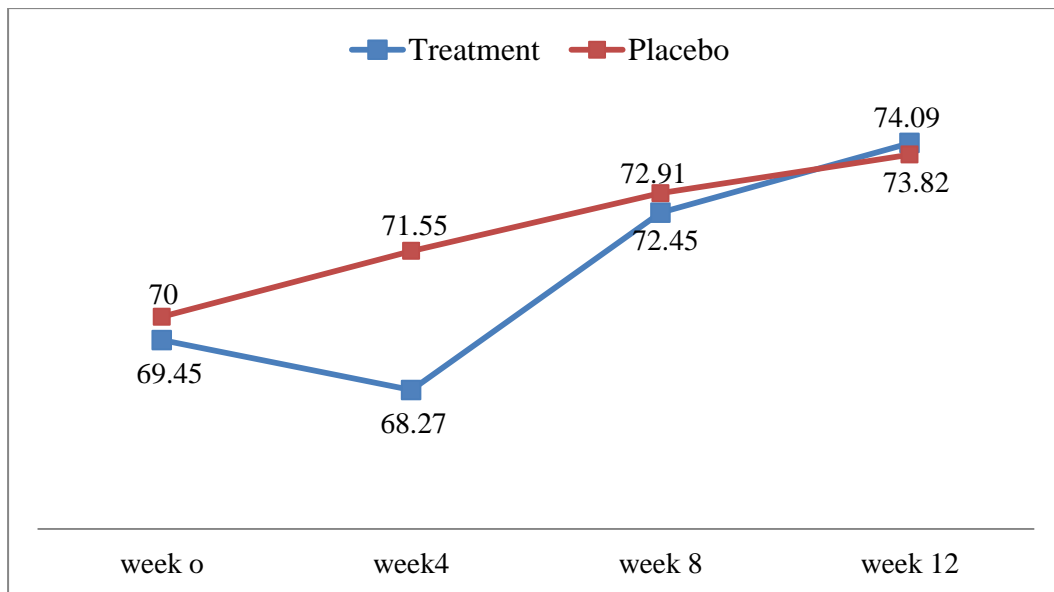


Figure 1. The thickness of eyelash at multiple times.

**Table 2** Average values of the eyelash thickened, of 11 subjects; due to the treatment and placebo at the week 12 relative to the baseline.

| Group     | Thickness (µm.) |      | df. | t    | p-value |
|-----------|-----------------|------|-----|------|---------|
|           | Mean            | S.D. |     |      |         |
| Treatment | 4.64            | 2.11 | 20  | 0.77 | 0.450   |
| Placebo   | 3.82            | 2.82 |     |      |         |

In week 8 and week 12, the thickness of eyelashes on the treatment side was significantly increased (p-value = 0.033). The thickness of eyelash on the treatment side increased approximately 6%. On the placebo side, the eyelash was significantly increased in thickness as early as week 4 (p-value <0.001). The results of the eyelash thickness using placebo were approximate 5.46% thickened.

In comparing the eyelash thickness of subjects in several durations between the eyelash with treatment and the eyelash with placebo using student t-test since baseline to 12 weeks were found no significant difference result. The average values of the eyelash thickened on the treatment side, of 11 subjects was 4.64 µm. Thus, the average values of the eyelash thickened on the placebo side, of 11 subjects was 3.82 µm.

**Table 3** The length of inner corner of eyelash line on the treatment side at multiple times. (n=11)

|                  | <b>Week0</b>  | <b>Week4</b>  | <b>Week8</b>  | <b>Week12</b> | <b>P-value</b> |
|------------------|---------------|---------------|---------------|---------------|----------------|
| <b>Treatment</b> | 5.9091±1.1362 | 6±1           | 6±1           | 6.0909±1.0445 | 0.268          |
| <b>Placebo</b>   | 5.8182±0.9816 | 5.8182±0.9816 | 5.8182±0.9816 | 5.8182±0.9816 | N/A            |
| <b>p-value</b>   | 0.908         | 0.472         | 0.928         | 0.956         |                |

**Table 4** Comparison of Average values of the eyelash lengthens in the inner corner of the lash line, of 11 subjects; due to the treatment and placebo at the week 12 relative to the baseline.

| <b>Group</b> | <b>Length (mm.)</b> |             | <b>df.</b> | <b>t</b> | <b>p-value</b> |
|--------------|---------------------|-------------|------------|----------|----------------|
|              | <b>Mean</b>         | <b>S.D.</b> |            |          |                |
| Treatment    | 0.1818              | 0.4045      | 20         | 1.4907   | 0.167          |
| Placebo      | 0                   | 0           |            |          |                |

**Table 5** The eyelash length of the outer corner at multiple times. (n=11)

|                  | <b>Week0</b>  | <b>Week4</b>  | <b>Week8</b>  | <b>Week12</b> | <b>P-value</b> |
|------------------|---------------|---------------|---------------|---------------|----------------|
| <b>Treatment</b> | 5.8182±0.8736 | 6.0909±1.0445 | 6.0909±1.0445 | 6.1818±1.2505 | 0.099          |
| <b>Placebo</b>   | 5.7273±1.009  | 5.7273±1.009  | 5.7273±1.009  | 5.7273±1.009  | N/A            |
| <b>p-value</b>   | 0.824         | 0.416         | 0.416         | 0.359         |                |

**Table 6** Comparison of the average lengthened of the outer corner eyelash, of 11 subjects; between the treatment and placebo at the week 12 relative to the baseline.

| <b>Group</b> | <b>Length (mm.)</b> |             | <b>df.</b> | <b>t</b> | <b>p-value</b> |
|--------------|---------------------|-------------|------------|----------|----------------|
|              | <b>Mean</b>         | <b>S.D.</b> |            |          |                |
| Treatment    | 0.3636              | 0.6742      | 20         | 1.7889   | 0.104          |
| Placebo      | 0                   | 0           |            |          |                |

The increasing of the eyelash lengths at the inner corner and the outer corner after the treatment relative to the baseline was 3% and 6.2% respectively. It was found that the eyelash length at the inner corner and the outer corner of the treatment side from the baseline to 12 weeks duration was lengthened insignificantly. Meanwhile, the eyelash length on the placebo side was not lengthened in every area.

Comparing of the eyelash length of the inner corner and the outer corner, after applying treatment and placebo; from the baseline to the week 12 found that the lengthened between the treatment was not differed from the placebo significantly in statistical.

**Table 7** The length of the midpoint of eyelash line on the treatment side at multiple times. (n=11)

|                  | <b>Week0</b>  | <b>Week4</b>  | <b>Week8</b>  | <b>Week12</b> | <b>P-value</b> |
|------------------|---------------|---------------|---------------|---------------|----------------|
| <b>Treatment</b> | 7.0909±0.9439 | 7.5445±1.1282 | 7.6364±1.206  | 7.7273±1.2721 | 0.022*         |
| <b>Placebo</b>   | 7.1818±0.8739 | 7.1818±0.8739 | 7.1818±0.8739 | 7.1818±0.8739 | N/A            |
| <b>p-value</b>   | 0.817         | 0.408         | 0.324         | 0.255         |                |

**Table 8** Comparison of the average lengthened of midpoint eyelash, of 11 subjects; between the treatment and placebo at the week 12 relative to the baseline.

| <b>Group</b> | <b>Length (mm.)</b> |             | <b>df.</b> | <b>t</b> | <b>p-value</b> |
|--------------|---------------------|-------------|------------|----------|----------------|
|              | <b>Mean</b>         | <b>S.D.</b> |            |          |                |
| Treatment    | 0.6364              | 0.8090      | 20         | 2.6087   | 0.026*         |
| Placebo      | 0                   | 0           |            |          |                |

On the midpoint treatment side, the eyelash length was significantly increased at week 8 and remain throughout the study (p-value=0.022). The increasing of the eyelash lengths of the midpoint lash line after the treatment relative to the baseline was 8.9%.

Comparing of the eyelash length of the midpoint, after applying treatment and placebo; from the baseline to the week 12 found that the lengthened between the treatment (0.6364±0.8090 mm.) was differed from the placebo (0 mm.) significantly in statistical (p-value = 0.026).

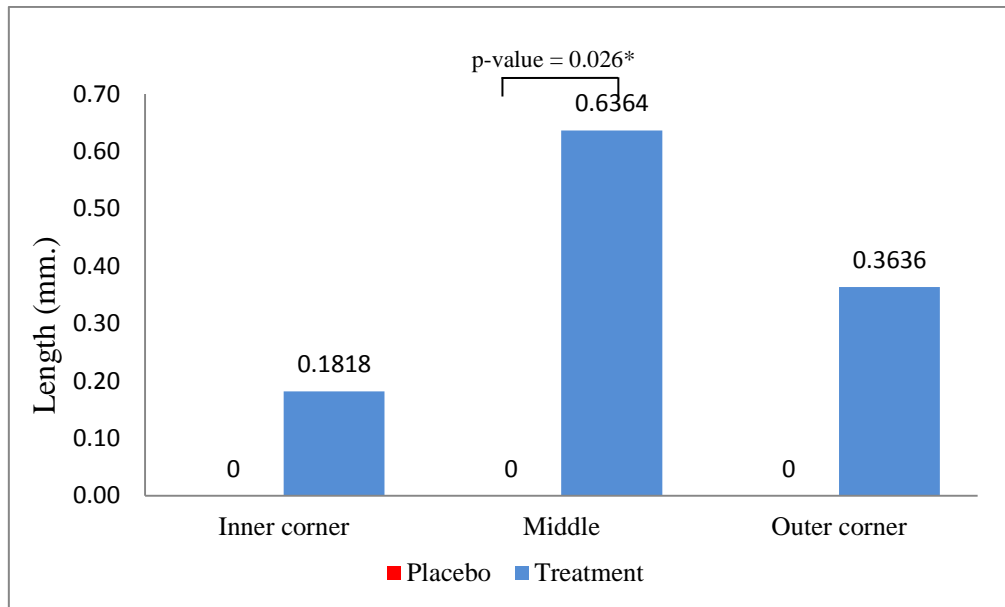


Figure 2 Comparison of the average lengthened of the eyelash in the different area, of 11 subjects; between the treatment and placebo at the week 12 relative to the baseline.

After this research project was finished. The satisfaction score from the participants of this research project was evaluated using descriptive analysis. Details were shown in the Figure 3. The Subject Self-Assessment of the efficacy of the treatment was assessed by using the questionnaire after week 12 of treatment. The questionnaire asks about the satisfaction of the thickness and the length of eyelashes on the left side and right side separately.

- 2.0 to -1.1 = Very dissatisfied
- 1.0 to -0.1 = Dissatisfied
- 0 to 0.9 = Neutral
- 1 to 1.9 = Satisfied
- 2 = Very satisfied



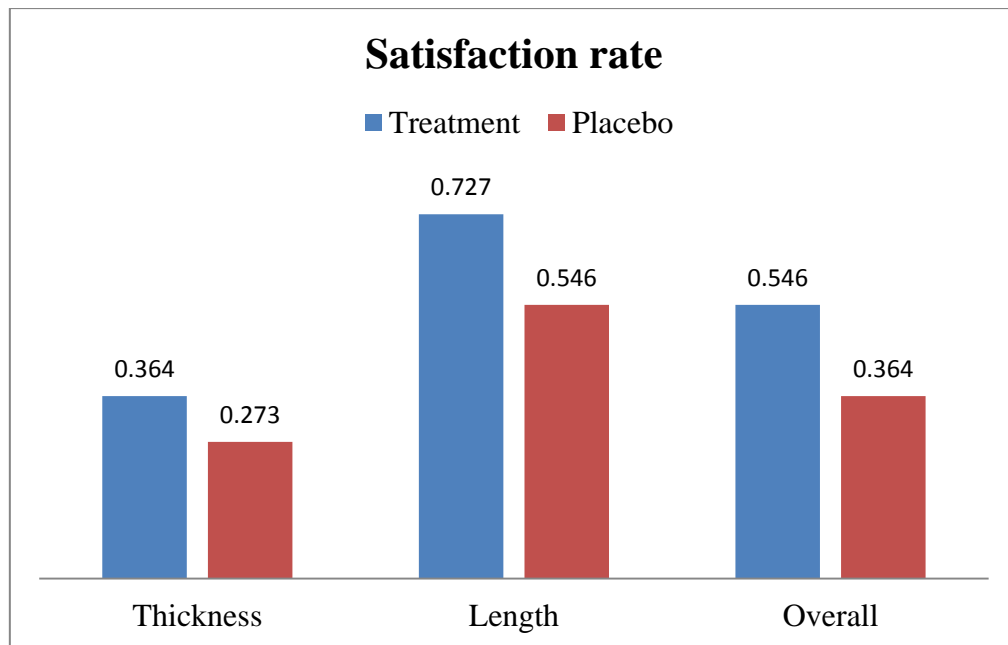


Figure 3 The comparison of the Satisfaction rate after week 12 between treatment and placebo.

The satisfaction score for the treatment side, thickness, length and overall were in a range of neutral (0 to 0.9). Similar to the placebo's satisfaction score. The comparison of the satisfaction score between treatment and placebo found that no significant statistical difference of the eyelash thickness between treatment side placebo side.

## Conclusion

### **The comparison of the thickness of eyelash after the week 12 of treatment with the baseline.**

Using castor oil treatment shown the result of eyelash thickening statistically significant in the week 8 and remained so throughout the study, likewise the study of Eyelash growth in subjects treated with bimatoprost reported the mean change in eyelash thickness from the baseline statistically significant in the week 8 (Stacy et al, 2011).

In this study, the eyelash thickness on the placebo side increased at week 4. Meanwhile, the thickness increase in week 8 and week12. Some eyelash on the

treatment side might be in the telogen phase during week 4 which was the phase that eyelashes started to fall out of the follicles and became to anagen phase again. As the result, in week 8, the thickness of eyelashes on the treatment side increased 6.25% when the placebo side in week 8 was 1.9% thickened. The mechanism of castor oil was unknown. Castor oil might stimulate telogen phase to anagen phase just like 0.3% Bimatoprost solution (Warison, 2015). Comparing the difference of the average results between the eyelash thickness using the treatment and placebo in difference duration relative to the baseline, no significant difference result was found.

### **The comparison of the eyelash length after the week 12 of treatment with the baseline**

Stacy et al (2011) reported 0.3% Bimatoprost shown a significant improvement of the length of eyelashes as early as the week 4<sup>th</sup>. From the study the changing of the eyelash length after treatment with Castor oil found insignificantly lengthen of the eyelash at the inner corner, midpoint and the outer corner in different treatment durations. Meanwhile, the average lengths of the eyelash at the inner corner, midpoint and the outer corner of the placebo side were not lengthened. Comparing of the eyelash length after applying treatment and placebo, from the baseline to the week 12<sup>th</sup>; only significantly different at the midpoint of eyelash line was found. Prostaglandin analog has been reported that it could be stimulated the telogen phase to the anagen phase and it was able to prolong the anagen phase (Murray et al, 2002). Castor oil has been reported that it contains Ricinoleic acid to specifically activate prostaglandin receptors (Sorin et al, 2012). Comparing the result to another prostaglandin analogs, Bimatoprost; was a method for achieving longer and thicker eyelashes. Thus, the mechanisms by which castor oil effect to the hair cycle changes was not clear and warrant further study.

### **The analysis of the side effect.**

From the study of Eyelash growth in subjects treated with bimatoprost reported that eye irritation more than 2% of subjects were found. Eight subjects discontinued the study because of eczema, dry eye, eye inflammation, and contact

dermatitis (Stacy et al, 2011). In contrast, this study found 3 participants were a little discomfort on both sides of the eyes in the morning. It could be happened due to a few of solution dropped into their eyes during the night after applying those solutions before going to bed.

### **Suggestions**

According to the experience obtained from this research work, some information can be suggested to study for the new knowledge such as:

- A higher castor oil concentration can be used to determine the dose-response.
- The longer experimentation duration may give different results.

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