

# **Microneedling with and without Vitamin C versus Fractional CO<sub>2</sub> LASER in Treating Abdominal Striae Distensae Alba: A Comparative Clinical and Histopathological Study**

*Thesis*

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالَ

لَسْبَحَانَكَ لَا عِلْمَ لَنَا  
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ  
الْعَلِيمُ الْعَظِيمُ

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# List of Contents

<i>Title</i>	<i>Page No.</i>
List of Abbreviations .....	i
List of Tables.....	iii
List of Figures .....	v
List of Photos .....	vi
Introduction .....	1
Aim of the work .....	4
<b><u>Review of literature</u></b>	
<b>Chapter (1):</b> Striae Distensae .....	5
<b>Chapter (2):</b> Treatment .....	16
Patients and methods.....	33
Results .....	46
Case Presentation .....	69
Discussion .....	104
Conclusion.....	112
Recommendations .....	113
Summary .....	114
References .....	116
Arabic summary.....	--

## **List of Abbreviations**

<i>Abbr.</i>	<i>Full term</i>
<b>BMI:</b> .....	Body Mass Index
<b>BW:</b> .....	Birth Weight
<b>cm<sup>2</sup>:</b> .....	Centimeter Square
<b>CO<sub>2</sub>:</b> .....	Carbon Dioxide
<b>EMLA:</b> .....	Eutectic Mixture of Local Anesthesia
<b>Er-YAG:</b> .....	Erbium-doped yttrium aluminum garnet
<b>gm:</b> .....	Gram
<b>H&amp;E:</b> .....	Hematoxylin and Eosin
<b>IPL:</b> .....	Intense Pulsed Light
<b>IQR:</b> .....	Interquartile range
<b>J:</b> .....	Joule
<b>LASER:</b> .....	Light Amplification by Stimulated Emission of Radiation
<b>LFE:</b> .....	Linear Focal Elastosis
<b>m RNA:</b> .....	Messenger RNA
<b>mg:</b> .....	Milligram
<b>mj:</b> .....	Millijoule
<b>ml:</b> .....	Milliliter
<b>mm:</b> .....	Millimeter
<b>ms:</b> .....	Millisecond

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*List of Abbreviations*

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<b>n:</b> .....	Number
<b>Nd yag:</b> .....	Neodymium-Doped yttrium aluminum garnet
<b>nm:</b> .....	Nanometer
<b>PCI:</b> .....	Percutaneous Collagen Induction
<b>PDL:</b> .....	Pulsed dye LASER
<b>PIH:</b> .....	Post-Inflammatory Hyperpigmentation
<b>SD:</b> .....	Standard deviation
<b>SG:</b> .....	Striae Gravidarum
<b>SPSS:</b> .....	Statistical Package for the Social Sciences
<b>TGF-<math>\beta</math>:</b> .....	Transforming Growth Factor Beta
<b>TRT:</b> .....	Thermal Relaxation Time
<b>UV:</b> .....	Ultraviolet
<b><math>\mu</math>j:</b> .....	Microjoule
<b><math>\mu</math>m:</b> .....	Micrometer

## List of Tables

<i>Table No.</i>	<i>Title</i>	<i>Page No.</i>
<b>Table (1):</b>	Demographic data of the patients (n=25).....	46
<b>Table (2):</b>	Distribution of cases according to the duration of striae distensae alba (years) (n=25). ....	48
<b>Table (3):</b>	Causes of striae distensae alba (n=25). ....	49
<b>Table (4):</b>	Severity of striae distensae alba according to Davey score (n=25). ....	50
<b>Table (5):</b>	Comparison between the average score of two blinded dermatologists and score of patient satisfaction after treatment with microneedling only ( <b>Area A</b> ). ....	51
<b>Table (6):</b>	Comparison between the average score of two blinded dermatologists and score of patient satisfaction after treatment with microneedling with vitamin C ( <b>Area B</b> ). ....	52
<b>Table (7):</b>	Comparison between the average score of two blinded dermatologists and score of patient satisfaction after treatment with fractional CO <sub>2</sub> LASER ( <b>Area C</b> ). ....	53
<b>Table (8):</b>	Comparison between the three treatment groups according to the clinical evaluation by the score of two blinded dermatologists. ....	54
<b>Table (9):</b>	Comparison between the three treatment groups according to the clinical evaluation by the score of patient satisfaction. ....	55
<b>Table (10):</b>	Comparison between the epidermal thickness before and after treatment. ....	56
<b>Table (11):</b>	Comparison between the thickness of rete ridges before and after treatment. ....	58
<b>Table (12):</b>	Comparison between the mean percentage of collagen content before and after treatment. ....	60

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## *List of Tables*

---

<b>Table (13):</b>	Comparison between the mean percentage of elastin content before and after treatment .....	62
<b>Table (14):</b>	Relation between the duration (years) of striae distensae alba and the mean percentage of collagen content ( $n=10$ ). .....	64
<b>Table (15):</b>	Relation between the cause of striae distensae alba and the mean percentage of collagen content ( $n=10$ ). .....	65
<b>Table (16):</b>	Relation between the score of striae distensae alba and the mean percentage of collagen content ( $n=10$ ). .....	66
<b>Table (17):</b>	Comparison between the three treatment groups according to the pain score. ....	67
<b>Table (18):</b>	Comparison between the three treatment groups according to the occurrence of post inflammatory hyperpigmentation (PIH). ....	68



# List of Figures

<i>Fig. No.</i>	<i>Title</i>	<i>Page No.</i>
<b>Figure (1):</b>	Normal skin histology vs Striae distensae histology.....	11
<b>Figure (2):</b>	Buchanan chart used to assess stretch mark scores.....	36
<b>Figure (3):</b>	Panasonic <sup>(R)</sup> , lumix, 16.1 megapixels digital camera, Japan. ....	37
<b>Figure (4):</b>	Microneedling (Derma pen) Bomtech <sup>(R)</sup> Electronics .....	39
<b>Figure (5):</b>	Bison <sup>(R)</sup> Medical Fire-xel LASER .....	40
<b>Figure (6):</b>	Olympus <sup>(R)</sup> (Binocular Version) Biological Microscope, UK.....	43
<b>Figure (7):</b>	Sex distribution of the patients.....	47
<b>Figure (8):</b>	Distribution of cases according to the causes of striae distensae alba (n=25).....	49
<b>Figure (9):</b>	Distribution of cases according to the severity of striae distensae alba (n=25).....	50
<b>Figure (10):</b>	Comparison between the epidermal thickness before and after treatment. ....	57
<b>Figure (11):</b>	Comparison between the thickness of rete ridges before and after treatment. ....	59
<b>Figure (12):</b>	Comparison between the mean percentage of collagen content before and after treatment. ....	61
<b>Figure (13):</b>	Comparison between the mean percentage of elastin content before and after treatment .....	63

## List of Photos

<i>Photo. No.</i>	<i>Title</i>	<i>Page No.</i>
<b>Photo (1):</b>	<b>Case 1:</b> 42 years old female patient complained of (severe) striae distensae alba after pregnancy.....	69
<b>Photo (2):</b>	<b>Case 1:</b> Striae alba before treatment showing randomly distributed collagen with increased inter-fibrillary spaces.....	70
<b>Photo (3):</b>	<b>Case 1:</b> Biopsies after the treatment modalities showed an increase in the number and density of collagen fibers, decreased inter-fibrillary spaces and there was good linear orientation of the fibers parallel to the dermo-epidermal junction in all sides. ....	71
<b>Photo (4):</b>	<b>Case 1:</b> The elastin fibers on the papillary dermis are significantly reduced in striae. ....	72
<b>Photo (5):</b>	<b>Case 1:</b> Biopsies after the treatment modalities showing an increase in the number and density of elastic fibers.....	73
<b>Photo (6):</b>	<b>Case 1:</b> Histopathological examination of the skin biopsies obtained before treatment demonstrated thin atrophic epidermis and flat dermo-epidermal junction. ....	74
<b>Photo (7):</b>	<b>Case 1:</b> Biopsies after the treatment modalities showed an increase in the thickness of the epidermis .....	75
<b>Photo (8):</b>	<b>Case 2:</b> 35 years old male patient complained of (severe) striae distensae alba after systemic corticosteroid administration. The right part (A <sub>2</sub> ) showed mild improvement ,the middle part (B <sub>2</sub> )showed moderate improvement, the left part showed mild improvement. ....	76
<b>Photo (9):</b>	<b>Case 2:</b> Striae alba before treatment showing randomly distributed collagen with increased inter-fibrillary spaces.....	77

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## *List of Photos*

---

<b>Photo (10):</b>	<b>Case 2:</b> Biopsies after the treatment modalities showed an increase in the number and density of collagen fibers, decreased inter-fibrillary spaces and there was good linear orientation of the fibers parallel to the dermo-epidermal junction in all sides. ....	78
<b>Photo (11):</b>	<b>Case 2:</b> The elastin fibers on the papillary dermis are significantly reduced in striae. ....	79
<b>Photo (12):</b>	<b>Case 2:</b> Biopsies after the treatment modalities showing an increase in the number and density of elastic fibers.....	80
<b>Photo (13):</b>	<b>Case 2:</b> Histopathological examination of the skin biopsies obtained before treatment demonstrated thin atrophic epidermis and flat dermo-epidermal junction. ....	81
<b>Photo (14):</b>	<b>Case 2:</b> Biopsies after the treatment modalities showed an increase in the thickness of the epidermis. ....	82
<b>Photo (15):</b>	<b>Case 3:</b> 26 years old female patient complained of (severe) striae distensae alba due to obesity, the right part (A <sub>2</sub> ) showed mild improvement, the middle part (B <sub>2</sub> ) showed good improvement and the left part (C <sub>2</sub> ) showed mild improvement.....	83
<b>Photo (16):</b>	<b>Case 3:</b> Striae alba before treatment showing randomly distributed collagen with increased inter-fibrillary spaces .....	84
<b>Photo (17):</b>	<b>Case 3:</b> Biopsies after the treatment modalities showed an increase in the number and density of collagen fibers, decreased inter-fibrillary spaces and there was good linear orientation of the fibers parallel to the dermo-epidermal junction in all sides. ....	85
<b>Photo (18):</b>	<b>Case 3:</b> The elastin fibers on the papillary dermis are significantly reduced in striae. ....	86
<b>Photo (19):</b>	<b>Case 3:</b> Biopsies after the treatment modalities showing an increase in the number and density of elastic fibers.....	87

<b>Photo (20):</b>	<b>Case 3:</b> Histopathological examination of the skin biopsies obtained before treatment demonstrated thin atrophic epidermis and flat dermo-epidermal junction.....	88
<b>Photo (21):</b>	<b>Case 3:</b> Biopsies after the treatment modalities showed an increase in the thickness of the epidermis .....	89
<b>Photo (22):</b>	<b>Case 4:</b> 25 years old female patient complained of (severe) striae distensae alba after systemic corticosteroids administration. The right part (A <sub>2</sub> ) showed excellent improvement, the middle part (B <sub>2</sub> ) showed good improvement and the left part (C <sub>2</sub> ) showed no improvement with PIH.....	90
<b>Photo (23):</b>	<b>Case 4:</b> Striae alba before treatment showing randomly distributed collagen with increased inter-fibrillary spaces .....	91
<b>Photo (24):</b>	<b>Case 4:</b> Biopsies after the treatment modalities showed an increase in the number and density of collagen fibers, decreased inter-fibrillary spaces and there was good linear orientation of the fibers parallel to the dermo-epidermal junction in all sides. ....	92
<b>Photo (25):</b>	<b>Case 4:</b> The elastin fibers on the papillary dermis are significantly reduced in striae. ....	93
<b>Photo (26):</b>	<b>Case 4:</b> Biopsies after the treatment modalities showing an increase in the number and density of elastic fibers.....	94
<b>Photo (27):</b>	<b>Case 4:</b> Histopathological examination of the skin biopsies obtained before treatment demonstrated thin atrophic epidermis and flat dermo-epidermal junction. ....	95
<b>Photo (28):</b>	<b>Case 4:</b> Biopsies after the treatment modalities showed an increase in the thickness of the epidermis .....	96
<b>Photo (29):</b>	<b>Case 5:</b> 19 years old female patient complained of (moderate) striae distensae alba due to obesity. The right, middle and left parts showed excellent improvement. ....	97

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## *List of Photos*

---

- Photo (30):**    **Case 5:** Striae alba before treatment showing randomly distributed collagen with increased inter-fibrillary spaces .....98
- Photo (31):**    **Case 5:** Biopsies after the treatment modalities showed an increase in the number and density of collagen fibers, decreased inter-fibrillary spaces and there was good linear orientation of the fibers parallel to the dermo-epidermal junction in all sides. ....99
- Photo (32):**    **Case 5:** The elastin fibers on the papillary dermis are significantly reduced in striae. ....100
- Photo (33):**    **Case 5:** Biopsies after the treatment modalities showing an increase in the number and density of elastic fibers.....101
- Photo (34):**    **Case 5:** Histopathological examination of the skin biopsies obtained before treatment demonstrated thin atrophic epidermis and flat dermo-epidermal junction. ....102
- Photo (35):**    **Case 5:** Biopsies after the treatment modalities showed an increase in the thickness of the epidermis .....103

## INTRODUCTION

**S**triae distensae, a common skin condition, represent linear dermal scars accompanied by epidermal atrophy (*Chang et al., 2004*).

Striae distensae affect skin that is subjected to continuous and progressive stretching, increased stress is placed on the connective tissue due to increased size of the various parts of the body (*Forbat and Al-Niaimi, 2018*).

Striae distensae are a reflection of "breaks" in the connective tissue. Skin distention may lead to excessive mast cell degranulation with subsequent damage of collagen and elastin (*Salter and Kimball, 2006*). Prolonged use of oral or topical corticosteroids or Cushing syndrome (increased cortical activity) leads to the development of striae (*Schoepe et al., 2006*).

Various therapeutic approaches like topical tretinoin, hydrant creams, different acid peels and microdermabrasion have been proposed for the improvement of striae distensae (*Park et al., 2012*).

Other modalities, such as pulsed light and 585 nm flash lamp-pumped pulsed-dye LASER (PDL) have also

been proposed with variable results (*Al-Dhalimi and Abo Nasyria, 2013*).

Microneedling only, microneedling combined with topical vitamin C and fractional CO<sub>2</sub> LASER showed promising results in treatment of striae distensae alba (*Naspolini et al., 2019*), (*Casabona and Marchese, 2017*).

Microneedling is being used in dermatology for mainly two purposes, firstly, collagen induction therapy for scars, stretch marks and antiaging effect and secondly, for deep transdermal delivery of active substances through epidermal barrier (stratum corneum) (*Denet et al., 2004*). The microchannel formation enhances penetration of product and stimulates collagen production for rejuvenation and treatment of acne scars and stretch marks (*Aust et al., 2008*).

Vitamin C, ascorbic acid factor, plays a dual role. It is a required cofactor for several hydroxylases and monooxidases. It is also the most significant scavenger of free radicals by allowing vitamin E to remain in its active form (*Hinek et al., 2009*). In the dermis, vitamin C is required for the formation of hydroxyprolyl residues to form stable triple-helical collagen molecules and hydroxylysyl residues operating in crosslinks synthesis (*Humbert et al., 2010*).