CASE REPORT

Laser acupuncture and electroacupuncture induced height increase: a case report

Georgios Papadopoulos[1], Evangelia Samara[2], Petros Tzimas[1]

[1]Department of Anaesthesiology and Postoperative Intensive Care, Faculty of Medicine, School of Health Sciences, University of Ioannina, Greece, [2]Department of Anaesthesiology, Onassis Cardiac Surgery Center, Athens, Greece

ABSTRACT

Low height in teenagers is considered to have negative social impact. We present the case of a teenager who underwent laser acupuncture and elec-troacupuncture to increase his height. A 15-year-old teenager, whose height was165 cm for two years underwent Low Lever Laser Therapy (LLLT) and electroacupuncture. A total of 16 sessions were applied as frequent as once to twice a week. The hand x-ray was compatible with the age of 17. Pre-treatment binding protein IGFBP-3 level was significantly low (0.7 ng/mL), to be increased one month later (5.3ng/mL) and remain within normal range (4.5 ng/mL) four months later. Three months post treatment, the teenager gained 2 cm of height and a month later 2 cm more. Body weight and nose length did not alter. A patient undergoing laser acupuncture and electroacupuncture treatment gained 4 cm in four months. To verify the effectiveness of such treatment, further studies need to be carried out.

Keywords: growth hormone, laser acupuncture, Low Level Laser Therapy, case report, short stature

G. Papadopoulos, E. Samara, P. Tzimas. Laser acupuncture and electroacupuncture induced height increase: a case report. Scientific Chronicles 2021; 26(2): 330-335

INTRODUCTION

Low height in teenagers is considered to have negative social impact and cause concern both to them and their parents [1,2].

Growth hormone (GH) therapy for height gain in children has been considered safe. However, individual responses to growth hormone therapy are highly variable and the mean final height in treated individuals remains relatively small compared to average height. In addition, significant side effects have been reported, such as benign intracranial hypertension, femoral head slip, scoliosis, acromegaly features, pancreatitis and more. [3]

There is an increasing demand for alternative therapies that are safe and effective in stimulating the growth plate and finally increasing the height of children.

We present the case of a teenager who underwent laser acupuncture and electroacupuncture to increase his height.

CASE PRESENTATION

A 15-year-old teenager visited the outpatient clinic seeking a method to increase his height. According to his history, his height was 165 cm, non-increasing for the last two (2) years and he had experienced a lot of stress and significant difficulties in sleeping, while his parents had been even more anxious. Father's and mother's height was 160cm and 163cm respectively.

He also stated that he had visited an endocrinologist, who, after laboratory testing and a hand x-ray performed, suggested treatment with growth hormone, about which the family had several reservations.

After informed consent, the teenager underwent Low Lever Laser Therapy (LLLT) with red light. The device used was Physiolaser Olympic®, REIMERS & JANSSEN GmbH Medical Laser, (635-680 nm / 40 mW). Laser stimulation was performed on acupuncture points ST36 (Zu San Li) and SP6 (San Yin Jiao), bilaterally, commonly used in the treatment of growth stimulation [4]. Acupuncture points were detected using a point detector and dosimetry was 5 J energy, 20 sec duration, and 471 Hz for the stomach meridian, 702Hz for the spleen meridian frequency. The 3 mm diameter laser beam was in contact and perpendicular to the skin.

Particular emphasis was also placed on the anxiety treatment by applying sequential electroacupuncture of 2 Hz frequency and 60 sec duration at the ac-upuncture points: H9, P6, H3, Yin Tang and GV20 as well as for the treatment of insomnia at points UB62, K5, LI4, H7, L9, P6, Yin Tang. A total of 16 laser and electroacupuncture sessions were applied as frequent as once to twice a week.

Adolescent's height was measured before treatment, one month and four months later.

Based on the Greulich and Pyle atlas [5], the x-ray was compatible with the chronological age of 17 with SD = 15.1 months.

Pre-treatment laboratory testing revealed a significant deficiency of the binding protein IGFBP-3 (0.7 ng/mL), with normal values of IGF–1 (333 ng/mL, normal range 202 - 907ng/mL). One month and six (6) sessions later, IGFBP-3 was significantly increased (5.3ng/mL) and IGF-1 was increased to 360 ng/mL, while four months later, both IGFBP-3 and IGF-1 levels remained within normal range (4.5 and 317 ng/mL, respectively). Table 1 demonstrates the variation of laboratory findings before treatment, one month and four months later.

Prolactin, thyroid, and gonadotropin hormones' levels, as well as cortisol and other laboratory tests were and remained within normal levels pre and post treatment.

Three months post treatment, the teenager's height rose from 165 to 167 cm and a month later to 169 cm. Unfortunately, due to the family's relocation, we could not follow him up for six months.

	I	II	III	normal range
hGH (ng/ml)	0.07	0.09	0.07	(0.01 – 0.97)
IGF – 1 (ng/ml)	337	360	317	(202 - 907)
IGFBP – 3 (ng/ml)	0.7	5.3	4.5	(2.9 – 7.3)
Ca^{2+} (mg/dl)	9.5	9.6	9.5	(8.2 – 10.6)
25-OH-D (ng/ml)	33.97	33.89	35	(30 –60)

Table 1. Laboratory findings before treatment (I), one month later (II) and four months later (III).

The body weight (62 kg) and the nose length remained unchanged.

Both the patient and the parents were satisfied with the treatment received, concerning the outcome and the fact that there were no adverse events.

DISCUSSION

In the presented case laser acupuncture induced a teenager's height increase by 4 cm in a 4-month period. Simultaneously, stress and insomnia alleviation was significant.

Body height increase is mainly due to the elongated bone growth, which reflects the synchronized processes of chondrogenesis (proliferation and differentiation of chondrocytes in the growth plates) and cartilage ossification (calcification in metaphysis). The growth plate is consisted by three layers: the sedative, the proliferative and the hypertrophic zones [6].

Our study also demonstrated a significant increase in IGFBP - 3 concentration, which was maintained within normal range for 4 months.

We consider a coincidental growth highly unlikely, based on the endocrinologist's consultation, who suggested growth hormone therapy. Moreover, there has been a change in IGFBP - 3 concentration while on acupuncture treatment. However, such case cannot be excluded.

IGFBP-3 (Insulin-like growth factor-binding - protein 3) is encoded in humans by the IGFBP3 gene and is one of six (IGFBP-1 to IGFBP-6) binding proteins to bind the growth factors IGF-1 and IGF- 2 with high affinity. It is the major circulatory protein of IGF in the bloodstream, mainly found in stable complexes containing the binding protein IGF-1 and IGF-2, and a third protein, the ac-id-labile subunit (ALS).

Within tissues, IGF-1 and IGF-2 are released by many cell types and activate the IGF-1

receptor. IGFBP-3 also interacts with cell surface proteins, affecting cellular signaling and also entering the cell nucleus where it binds to nuclear hormone receptors as well as other receptors. IGFBP-3 levels depend on growth hormone (GH) and are increased in acromegaly and in children with growth hormone deficiency. [7]

IGF-1 is an important factor in longitudinal bone growth by stimulating the platelet chondrocyte proliferation [8]

LLLT is a non-invasive form of phototherapy which shares the same principles as traditional acupuncture and proves an equal biological effect as needle acupuncture [9-11].

Recently, acupuncture as well as laser acupuncture (LA) have been proposed as an intervention to improve longitudinal bone growth in adolescent rats.

In a study by Yeom *et al* in adolescent male rats, laser acupuncture was found to promote longitudinal bone growth, with a significant increase in bone growth rate and platelet growth by increasing the number of chondrocytes in the hypertrophic zone. IGF-1 protein in growth plates was increased [12]. Also, longitudinal growth and final height regulation by systemic hormones, such as GH and IGF-1, is well known [13].

It seems that laser acupuncture can be a very promising intervention to improve the developmental potential of children and adolescents. Although the mechanism of laser acupuncture is not fully understood, the following effects of LLLT are known: cell growth, cell regeneration, and cellular activity increase [14]. This may help explain the positive mechanism of laser acupunc-ture in longitudinal bone growth.

Several studies have demonstrated the effects of LLLT on epithelial growth, but the results are controversial. Certain findings suggest that LLLT can stimulate chondrogenesis in vitro [15] and improve the cartilage structure in vivo. [16-17]

According to the literature, the effects of electroacupuncture on the growth plate and bones also seem to be important. In Yi Feng's study electroacupuncture was proved to increase the concentration of IGF-I and IGF-BP1 in a model of ovarian resection induced osteoporosis in rats.[18]

Our study is limited by the fact that we could not follow up the patient for more than the four-month treatment, as the family moved to another city and did not keep contact.

In conclusion, this case report describes a patient undergoing laser acupuncture and electroacupuncture treatment for height gain, who experienced positive clinical outcome gaining 4 cm in four months. To verify the effectiveness of such treatment, further studies need to be carried out.

REFERENCES

1. McArthur RG. Growth retardation: an approach to management. Can Fam Physician. 1985; 31:1039–1043.
2. Theunissen NCM, Kamp GA, Koopman HM, et al. Quality of life and self-esteem in children treated for idiopathic short stature. J Pedi-atr. 2002;140(5):507–515.
3. Allen DB. Growth hormone therapy for short stature: is the benefit worth the burden? Pediatrics. 2006;118(1):343–348.
4. Zhang W, Kanehara M, Ishida T, et al. Preventive and therapeutic effects of acupuncture on bone mass in osteopenic ovariectomized rats. Am J Chin Med. 2004;32(3):427–443.
5. Greulich W, Pyle I. Radiographic atlas of skeletal development of the hand and wrist. London: Stanford University Press; London1959
6. Hunziker EB. Mechanism of longitudinal bone growth and its regulation by growth plate chondrocytes. Microsc Res Tech. 1994;28(6):505–519.
7. Ranke MB. Insulin-like growth factor binding-protein-3 (IGFBP-3). Best Pract Res Clin Endocrinol Metab. 2015;29(5):701-711.
8. Wang Y, Nishida S, Sakata T, et al. Insulin-like growth factor-I is essential for embryonic bone development. Endocrinology. 2006;147(10):4753–4761.
9. Whittaker P. Laser acupuncture: past, present, and future. Lasers Med Sci. 2004;19(2):69–80.
10. Hsieh C, Hsieh C, Wu J, et al. Different brain network activations induced by modulation and nonmodulation laser acupuncture. Evid Based Com-plement Alternat Med. 2011; 2011:8 pages.951258
11. Litscher G. Cerebral and peripheral effects of laser needle-stimulation. Neurol Res. 2003;25(7):722–728.
12. Yeom M, Kim SH, Lee B, et al. Effects of laser acupuncture on longitudinal bone growth in adolescent rats. Evid Based Complement Alternat Med. 2013; 2013:424587. doi:10.1155/2013/424587
13. van der Eerden BCJ, Karperien M, Wit JM. Systemic and local regulation of the growth plate. Endocr Rev. 2003;24(6):782–801.
14. Dawood MS, Salman SD. Low level diode laser accelerates wound heal-ing. Lasers Med Sci. 2012;28(3):941–945.
15. Kushibiki T, Tajiri T, Ninomiya Y, et al. Chondrogenic mRNA expression in prechondrogenic cells after blue laser irradiation. J Photochem Photobiol B. 2010;98(3):211–215.
16. Lin H, He C, Luo Q, et al. The effect of low-level laser to apoptosis of chondrocyte and caspases expression, including caspase-8 and caspase-3 in rabbit surgery-induced model of knee osteoarthritis. Rheumatol Int. 2012;32(3):759–766.
17. Cressoni MDC, Giusti HHKD, Pião AC, et al. Effect of GaAlAs laser irradi-ation on the epiphyseal cartilage of rats. Photomed Laser Surg. 2010;28(4):527–532.
18. Yi F, Huagang L, Ying Z, et al. Electroacupuncture Promotes Insulin-Like Growth Factors System in Ovariectomized Osteoporosis Rats. Am J Chin Med. 2008;36(5):889-897.

ΠΑΡΟΥΣΙΑΣΗ ΠΕΡΙΣΤΑΤΙΚΟΥ

Αύξηση ύψους με Laser βελονισμό και ηλεκτροβελονισμό: αναφορά περιστατικού

Γεώργιος Παπαδόπουλος[1], Ευαγγελία Σαμαρά[2], Πέτρος Τζίμας[1]

[1]Πανεπιστημιακή Κλινική Αναισθησιολογίας και Μετεγχειρητικής Εντατικής Θεραπείας, Τμήμα Ιατρικής, Σχολή Ιατρικών Επιστημών, Πανεπιστήμιο Ιωαννίνων, [2]Αναισθησιολογικός Τομέας, Ωνάσειο Καρδιοχειρουργικό Κέντρο, Αθήνα

ΠΕΡΙΛΗΨΗ

Το χαμηλό ύψος στους εφήβους συχνά έχει αρνητικό κοινωνικό αντίκτυπο. Παρουσιάζουμε την περίπτωση ενός εφήβου που υποβλήθηκε σε βελονισμό με laser και ηλεκτροβελονισμό για αύξηση ύψους. Ένας 15χρονος έφηβος, του οποίου το ύψος ήταν 165 εκατοστά, αμετάβλητο για δύο χρόνια, υποβλήθηκε σε Low Lever Laser Therapy (LLLT) και ηλεκτροβελονισμό. Συνολικά εφαρμόστηκαν 16 συνεδρίες με συχνότητα μία έως δύο φορές την εβδομάδα. Η ακτινογραφία χειρός ήταν συμβατή με την ηλικία των 17 ετών. Τα επίπεδα της πρωτεΐνης IGFBP-3 πριν από τη θεραπεία ήταν σημαντικά χαμηλά (0,7 ng/mL), για να αυξηθούν ένα μήνα αργότερα (5,3ng/mL) και παραμείνουν εντός φυσιολογικού εύρους (4,5 ng/mL) τέσσερις μήνες αργότερα. Τρεις μήνες μετά τη θεραπεία, ο έφηβος κέρδισε 2 εκατοστά ύψους και ένα μήνα αργότερα 2 εκατοστά επιπλέον. Το σωματικό βάρος και το μήκος της μύτης παρέμειναν αμετάβλητα. Στην περίπτωσή μας, ένας ασθενής που υποβλήθηκε σε θεραπεία με βελονισμό και ηλεκτροβελονισμό κέρδισε 4 εκατοστά ύψους σε τέσσερις μήνες. Για να εξακριβωθεί η αποτελεσματικότητα μιας τέτοιας θεραπείας, θα πρέπει να διεξαχθούν περαιτέρω μελέτες.

Λέξεις ευρετηρίου: αυξητική ορμόνη, laser βελονισμός, Low Level Laser Therapy, ηλεκτροβελονισμός, χαμηλό ανάστημα

Γ. Παπαδόπουλος, Ε. Σαμαρά, Π. Τζίμας. Αύξηση ύψους με Laser βελονισμό και ηλεκτροβελονισμό: αναφορά περιστατικού. Επιστημονικά Χρονικά 2021; 26(2): 330-335

Συγγραφέας αλληλογραφίας: **Evangelia Samara,** E-mail: gelysamara@yahoo.com