

LOW REACTIVE LEVEL LASER THERAPY IN THE TREATMENT OF POST HERPETIC NEURALGIA

Katsumi Sasaki ¹, Toshio Ohshiro ², Takafumi Ohshiro ¹, Yuki Taniguchi ¹

1: *Keikokai Ohshiro Clinic, Tokyo, Japan*
2: *Japan Medical Laser Laboratory, Tokyo, Japan*

Post herpetic neuralgia (PHN) can be an extremely painful condition which in many cases proves resistant to all the accepted forms of treatment. It is frequently most severe in the elderly and may persist for years with no predictable course. Since 1980, we have been applying low reactive level laser therapy (LLLT) for patients with PHN. We report herein on the results of a retrospective study concerning those patients in whom LLLT has been applied for pain attenuation of PHN. One hundred and twenty-three patients (73 male, 50 female, mean age: 66.11yr) have received LLLT for various entities of PHN over the past 29 years. In these cases the affected tissue area(s) was as follows: thorax and back (48 cases); head and neck (41 cases); abdomen and lumbar (17 cases); upper limb (9 cases); and lower limb (8 cases). The overall total improvement rate was 60.16%. Patient whose treatment was given within six month of onset obtained the highest improvement rate (mean, 76.34%). LLLT was effective for PHN in the acute and chronic phase, but LLLT was particularly effective for the acute phase patients whose onset before treatment was 6 months or less. The results demonstrate a significant reduction in PHN pain intensity, hypersensitivity and other complaints

Key Words: LLLT, post herpetic neuralgia, pain relief, retrospective study

Introduction

Post herpetic neuralgia (PHN) can be an extremely debilitating condition. It is often associated with significant morbidity, and it can be cause allodynia, insomnia, fatigue, depression, and interference with daily activities. Herpes zoster affects 20-30% of individuals during their lifetime and up to 50% of those are over 80 years of age. ¹ PHN is the most common complication in the elderly. The condition usually regresses spontaneously within 1-6 months but can persist for many years. ^{3,4}

The treatment protocol for PHN is initiated with

antiviral drugs during the acute herpes zoster outbreak. Other treatment options for PHN include topical analgesics, opioid analgesics, tricyclic antidepressants, gabapentin, cutaneous stimulation, injection therapy, acupuncture and hypnotherapy. ^{7,8,10} Since 1980, we have been applying diode laser LLLT for PHN. This report presents a retrospective study on those cases in our clinic in which LLLT has been applied for PHN.

Patients and Method

This retrospective study was carried out on 123 PHN patients (male, 73; female, 50) who presented at the Ohshiro clinic for LLLT during the period from 1980 to 2008. The average age was 67.17±12.67 yr (Range: 20-90 yr) and the average period between PHN onset and treatment was 29±38.51 months. The average treatment period of LLLT was 3.44±8.78 months, and the average

Addressee for Correspondence:

Katsumi Sasaki M.D.,
Ohshiro Clinic
JR Shinanomachi Station Building 2F, 34 Shinanomachi,
Shinjuku, Tokyo 160-0016 JAPAN
Tel: +81-3-3352-0046
Fax: +81-3-3354-1103
E-mail: info@jml.co.jp

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Fig. 1: 830nm GaAlAs diode laser Ohlase3D1™ (JMLL)

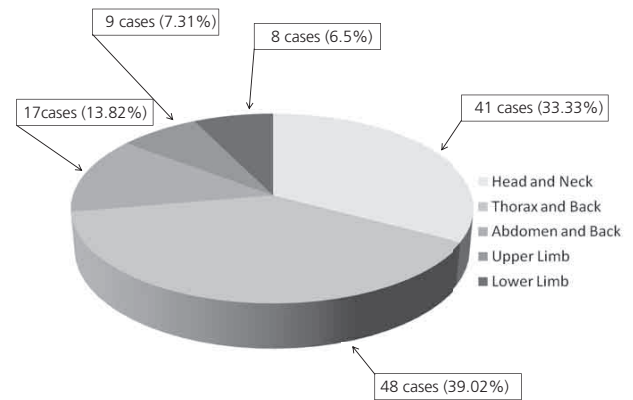


Fig. 2: Clinical Lesions of PHN (n=123)

Table 1. Patient and disease demographics

Number of patients	123
Sex	Male : 73 Female : 50
Average age	67.11±12.67 y.o (20-90)
Average period of PHN onset	29.11±38.51 months
Average period of LLLT	3.44±8.78 months
Average number of LLLT	13.3±15.97 times
Average time of LLLT	12.94±5.72 min.

Table 2. Clinical results of LLLT for PHN (n=123)

Clinical Assessment	No.
Excellent	10
Good	64
Fair	37
No change	12

Total efficacy rate 60.16% (Excellent+ Good / total No.)

number of LLLT sessions was 13.3±15.97 times with the average treatment time per session of 12.94±5.72 minutes. All cases were unilateral and affected the thorax and back (48 cases), head and neck (41 cases), abdomen and lumbar area (17 cases), upper limb (9 cases), or lower limb (8 cases) (**Figure 2**).

An 830 nm GaAlAs diode laser system, the Ohlase-3D1 (Japan Medical Laser Laboratory, Tokyo, Japan), was used for the laser therapy. This device gives an incident output power in continuous wave of 60 mW with an incident power density of 3W/cm². (**Figure 1**)

LLLT was performed every 1 or 2 weeks. Lesions were irradiated by the attending surgeon with the laser in the contact mode. Lesions were irradiated for 15 seconds per point giving an incident energy density of 45 J/cm², depending on the size and number of lesions existing on each patient.

Pain intensity was measured by patient self assessment on an 11-point linear visual analogue scale (VAS) of 0-10. Measured values for all patients at the endpoint of the treatment were subjected to statistical analysis using a two tailed Student's *t*-test.

Results

Table 1 shows the patient characteristics and disease demographics. One hundred and twenty-three patients with PHN were identified. There were 73 males and 50 females (average age: 67.11±12.67 years old). The average period between PHN onset and treatment was 29.11±38.51 months, the average period of LLLT was 3.44±8.78 months, the average number of LLLT sessions was 13.3±15.97, and the average time of each LLLT treatment session was 12.94±5.72 min. Affected areas were as described above and shown in **Figure 2**.

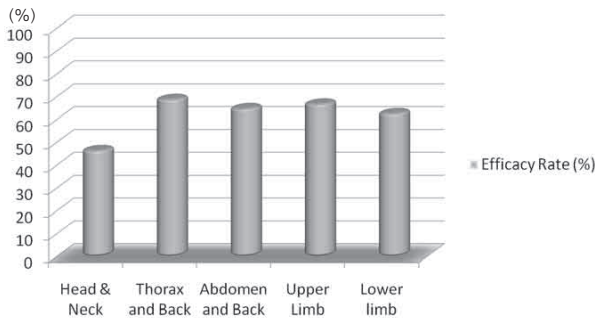


Fig. 3: Comparison of the efficacy rate by the region affected

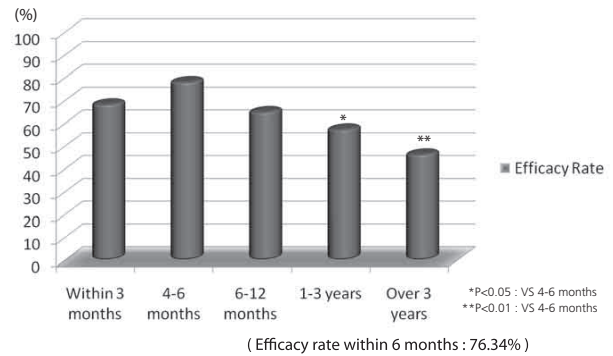


Fig. 4: Comparison of the clinical results by the period between onset and treatment

Table 3. Comparison of the clinical results by the region affected

Legion (No. of cases)	Avg. of age (years)	Avg. onset (months)	Avg. period of treatment (months)	Avg. No. of LLLT
Head and Neck (41 cases)	67.39	37.56	1.99	10.66
Thorax and Back (48 cases)	65.75	21.45	6.0	17.6
Abdomen and Back (17 cases)	69.59	32.35	1.53	11.59
Upper Limb (9 cases)	69.0	38.56	1.57	8.22
Lower Limb (8 cases)	66.38	14.15	1.64	10.38

Table 4. Comparison of efficacy rate by regions

Legion (No. of cases)	Excellent	Good	Fair	No change	Efficacy Rate (%)
Head and Neck (41 cases)	3	16	15	7	46.34
Thorax and Back (48 cases)	3	30	11	4	68.75
Abdomen and Back (17 cases)	1	10	6	0	64.7
Upper Limb (9 cases)	1	5	3	0	66.7
Lower Limb (8 cases)	2	3	2	1	62.5

The clinical results of LLLT are seen in **Table 2**. An excellent result was achieved in 10 patients, good in 64 patients, fair in 37 patients, and no change in 12 patients. No patient reported exacerbation of his or her symptoms. The total Efficacy Rate was 60.16%. (Total Efficacy Rate= Excellent + Good / Total Number Cases). **Table 3** shows the comparison of the clinical result broken down by the affected regions. In the thorax and back region, the therapeutic period tended to take longer and more treatment sessions were required compared with other lesions. In the head and neck group the efficacy rate was low (46.34%) and high in the thorax and back group (68.75%), abdomen and the back group (64.7%), upper limb (64.7%), and lower limb (62.5%). There was no significant difference between the main five areas affected. (**Table 4, Figure 3**)

Table 5 shows the comparison of the clinical

result broken down by the period between onset and treatment. The cases that were treated in 4-6 months of onset showed a better efficacy rate (86.67%) within an average treatment period of 2.62 months. In those patients who were treated after more than 1 year of onset, the average improvement rate was 50.72%, and the average treatment period was 3.38 months. The longer was the period from onset to starting the treatment, the longer was the time required to achieve the end treatment result.

The overall total improvement rate was 60.16%. Patient whose treatment was given within 2-6 months of onset obtained the highest improved rate (78.26%). LLLT was effective for PHN in the acute and chronic phase, but LLLT was particularly effective for the acute phase patients whose onset before treatment was 6 months or less. (**Table 6, Figure 4**) The treatment was most effective on lesions of the thorax and back. The

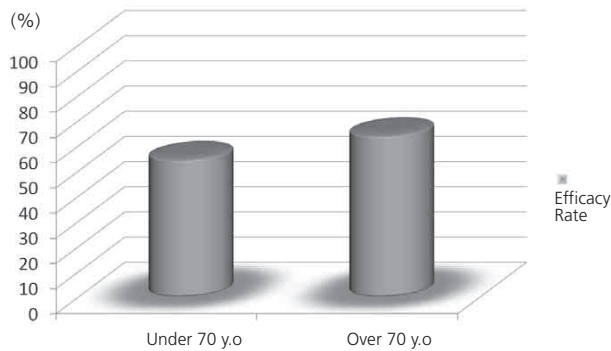


Fig. 5: Comparison of the clinical results by age of the patient

Table 6. Comparison of the clinical results by the period between onset and treatment

Period of onset	Excellent	Good	Fair	No change	Efficacy Rate (%)
Within 3 month (19 cases)	1	12	6	0	68.42
4-6 months (15 cases)	2	11	2	0	86.67
6-12 months (20 cases)	2	11	5	2	65.0
1-3 years (41 cases)	3	20	13	5	57.5
Over 3 years (28 cases)	2	10	11	5	46.43

key-point of the efficacy rate was the period between PHN onset and treatment. (Table 7) Early treatment after showing symptoms of PHN demonstrated a significant improvement between the effective group and the non effective group. Figure 5 shows the comparison of the clinical result broken down by age. There was no significant difference among age groups.

Discussion:

Herpes zoster results from reactivation of the Varicella zoster virus which lies persistently but clinically latent in the dorsal root and cranial nerve ganglia since primary infection, usually as a child, with Varicella chicken pox.¹¹⁾ Herpes zoster affects 20-30% of individuals during their lifetime and up to 50% of those are over 80 years old.²⁾ The most common complication of her-

Table 5. Comparison of clinical result by period of onset

Period of onset	Avg. of age (years)	Avg. onset (months)	Avg. period of treatment (months)	Avg. No. of LLLT
Within 3 month (19 cases)	62.26	1.42	5.63	14.53
4-6 months (15 cases)	64.93	4.8	1.86	8.73
6-12 months (20 cases)	68.35	10.05	2.74	14.05
1-3 years (41 cases)	68.29	24.05	4.83	16.37
Over 3 years (28 cases)	69.93	81.93	1.26	9.89

Table 7. Treatment results

	Effective group	Non effective group
Number of patients	74	49
Sex ratio	2 : 1	1 : 1
Average age	67.34±13.31	66.76±11.76
Average period: onset to LLLT	21.24±26.74	40.98±49.41
Average period of LLLT	4.11±8.65	2.42±8.95
Average number of LLLT sessions	15.61±17.49	9.82±12.75
Average PRS at end point	3.23±0.69	6.73±1.36
Treatment regions (cases)	Head and Neck 19 Thorax and Back 33 Abdomen and Back 11 Upper Limb 6 Lower Limb 5	Head and Neck 22 Thorax and Back 15 Abdomen and Back 6 Upper Limb 3 Lower Limb 3

pes zoster infection is post herpetic neuralgia (PHN).⁹⁾

The assessment of chronic pain is a difficult problem as it is subject to individual psychological and emotional influences.⁵⁾ Patients with long standing pain frequently demonstrate symptoms of depression. In the most severe and unrelieved pain, PHN can even induce a suicidal tendency⁶⁾ in spite of the many and varied forms of treatment available such as NSAIDs, opioids, and nerve blocks for pain relief.

Low reactive level laser therapy was first described by Ohshiro in 1984.^{6,9)} Originally LLLT was used for pain attenuation in cases with general orthopedic arthritis. Since 1975 we have experienced 8900 cases who have received LLLT for pain and neurologic disorders among almost 70,000 cases that have undergone laser treatment.¹²⁾

Although many of the direct effects of low level

laser irradiation at a cellular and local level have been elucidated by leading photobiologists such as Karu et al.¹³⁾, and Smith¹⁴⁾, the systemic effect of LLLT and its physiological pathways remain unclear.

According to Sato, ET al¹⁵⁾, laser irradiation in LLLT inhibited both the asynchronous firing that was induced by turpentine and increased part of the slow components of the action potentials. The laser irradiation thus selectively inhibited the signals of nociceptors to the peripheral nerves. In addition, LLLT is recognized as activating the dorsal horn gate control theory,^{16,17)} thereby selectively blocking or attenuating impulses along the incoming C- and A- δ pain transmission fibers.

We think that the therapeutic implication of LLLT for PHN is different in the acute phase and in the

chronic phase. In the acute case, LLLT was performed for peripheral neuritis due to viral infection as an anti-inflammatory agent. In the chronic phase, LLLT was performed for improvement of afferent pathway blockade and chronic pain attenuation.^{18,19)}

Conclusions:

LLLT was effective for PHN in the acute and chronic phase, but LLLT was particularly effective for the acute phase patients whose onset before treatment was 6 months or less. The results demonstrate a significant reduction in PHN pain intensity and other complaints. Further studies are warranted to examine the implications of the results in detail.

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