

The Effects of Nerve Reflex Points at the Foot on the Thoracic Paravertebral Muscles: a clinical trial.

Veldhuizen H.J.R. (*), Pauly N.M.H. (**)

* F.T., Manual Neurotherapist, MT, drs. Pedagogic sciences, teacher Manual Neurotherapy IRSK-Belgium

** F.T., Manual Neurotherapist, MT, principal teacher Manual Neurotherapy IRSK-WINGS Belgium

Abstract.

Description. The effect of pressing nerve reflex points for thoracic and lumbar dorsal rami at the foot bones on thoracic paravertebral muscles was measured by means of surface electromyography on patients with various forms of low back pain.

Aim. The authors wanted to check if there was a connection between the pressing of nerve reflex points at the foot and the tone of the spinal muscles. The study also checked if there was a connection between the location of the pressed point and the obtained effect. Furthermore, the correlation between the time sequence of the pain at the nerve reflex point and the tone of the muscles was investigated.

Method. Three groups of subjects were selected: an experimental group, a placebo group and a control group. The tone of the muscles was measured by means of a surface electromyography.

Results. A significant reduction of the tone of the muscles after pressing the nerve reflex points of the thoracic dorsal rami was found in the experimental group. There was no reduction in the placebo group and no significant reduction in the control group.

Conclusions. There is a connection between the pressing of nerve reflex points at the foot and the reduction of the tone of paravertebral muscles on condition that the location of the nerve reflex point on the foot is correct.

There is no obvious connection between the time sequence of the pain at the nerve reflex points and the tone of the muscles.

Key-words: [Reflexology] - [Nerve reflex points] - [Manual Neurotherapy] - [E.M.G.] - [spinal muscles]

1. Introduction.

The use of nerve reflex points at the foot has been mentioned for the first time in the book by W. Froneberg : "*Reflexzonetherapie*" in 1984.^[1] In this work, he describes the use of exactly located points at the bones of the foot. These points are in correlation with a nerve or a nervous structure and can be used to influence these by means of an adequate static pressing technique. For these reasons, Mr. Froneberg launched the term: "Nerve Reflex Zone-therapy". He located these points on a merely empirical basis and based himself on the reflexology as described by E. Ingham in 1938^[2] according to the work of Dr. Fitzgerald. Dr. Fitzgerald studied traditional Chinese methods of pressing reflex points of visceral structures at the plantar side of the foot. Mr. Froneberg placed the nerve reflex point-therapy in a concept of total treatment which he called: "Manual Neurotherapy".^[4] Every somatic or autonomic dysfunction is characterized by a disturbance in the efferent and/or afferent innervation. This disturbance may manifest itself in the peripheral innervation, in the spinal cord, in the cranial structures or in a combination of these elements.

The functional behaviour of the spine and its intrinsic and paravertebral muscles is thereby used as a start as well in the examination as in the treatment. In this way, a neuro-reflectory loading model is established.

- Input signal: 0-3000 μ V tt
- Indicated value: averaged EMG 0 - 1999 μ V: digital readable
- Common mode rejection: 100 dB (DC - 60 Hz) with 1 k disbalance
- Sensor head: three electrodes messing, 10 micron gilt on bouncing bars
- Battery: 9 Volt

The sensor heads must be covered by a contact gel before measuring.

Measuring protocol.

All the subjects lied in prone on a therapy table, the head turned to the most comfortable direction and the arms relaxed alongside the body. All measuring was done on the same table and in the same room. Light, temperature and noise were held as stable as possible.

First the skin was rasped with a special sponge. The subjects were then asked to relax for 1 minute. The sensor heads were then placed lateral from processus spinosus of TH6 at a distance between 2 and 3 cm. The bouncing sensor head guaranteed a constant pressure.

The most principal underlying muscles on that place are from dorsal to ventral:^[10]

- M. Trapezius,
- M. Rhomboideus,
- M. Longissimus thoracicus,
- M. Semispinalis thoracicus,
- M. Spinalis thoracicus.

Once the sensor head was placed and the values on the digital screen were balancing in the smallest limit, the average value was noticed. The device was then removed and replaced for repeated measuring after pressing the nerve reflex points at the foot, or, in the control group, after 30 seconds of waiting time.

2.2. Study design.

Selection.

Patients, with diverse forms of low back pain, treated in a private office for physiotherapy were submitted to the EMG measuring protocol as described above.

The potentials for muscles in a relaxed state are normally balancing from 1 to 8 μ V by surface EMG measuring. Values above 8 μ V are indicative for hypertone.^[11]

60 Patients (n = 60) with values > 10 μ V were hold back for the research. Their age was between 28 en 72 year en the proportion between sexes was 30/30.

Grouping.

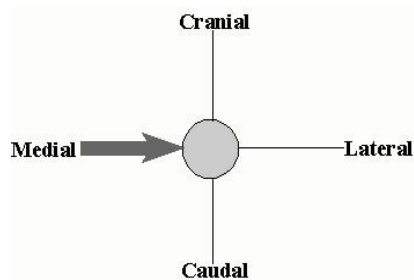
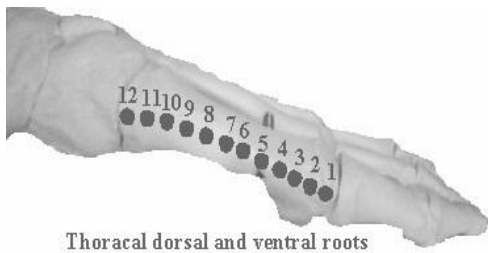
The patients were subdivided in three groups:

- group A named as experimental group: 20 persons ($n_1 = 20$)
9 male and 11 female
- group B named as placebo group: 20 persons ($n_2 = 20$)
10 male and 10 female
- group C named as control group: 20 persons ($n_3 = 20$)
11 male and 9 female

Test protocol.

After the initial EMG measuring the test was performed as follows.

In group A , nerve reflex points for rami dorsales of TH5, TH6 were pressed on the left foot. The lateral branches of these rami dorsales are providing the innervation of the selected paravertebral muscles .^[12]
^[13] While pressing the nerve reflex points the subject lied in the initial position.
 The nerve reflex points for TH5, TH6 en TH7 are localized on the left metatarsal I- bone , respectively on a 5/12, 6/12 and 7/12 distance from the caput.



The pressure direction goes from medial to lateral, 90° in the frontal plane. The ulnar side of the thumb is mainly used as pressure help and the therapist should feel contact between the periost of his thumb and the periost of the foot bone.

The pressure is being held constant. The subject should lift up his hand to indicate the pain he feels while pressing. The therapist stops pressing when the pain is gone.

The duration of pain was noted down in a ranking as 0-1-2-3.

0 = no pain

1 = pain between 1 and 8 seconds

2 = pain between 8 and 15 seconds

3 = pain longer than 15 seconds or persisting

After breaking up the pressure, the second EMG measurement was performed.

In group B or placebo group nerve reflex points for rami dorsales L1-L2-L3 on the left foot were pressed on. These branches have no direct influence on the thoracic muscles as mentioned above. The reflex points for this group are located on the medial side of the os cuneiforme mediale. Pressure direction, mode and protocol are the same as described for TH5, TH6 and TH7.

In group C, no reflex points were pressed on after the first measurement. The second measurement was performed after 30 seconds of waiting time.

3. Results and conclusions.

3.1. Results.

The results of the experiment are condensed in table 1.

Group A							Group B						Group C					
N	M/F	T5	T6	T7	W1	W2	N	M/F	L1	L2	L3	W1	W2	N	M/F	W1	W2	
1	F	2	3	2	18	15	1	F	0	0	0	19	18	1	F	13	13	
2	F	2	3	1	14	10	2	M	0	0	2	12	12	2	M	18	16	
3	F	1	2	1	17	11	3	M	2	2	2	18	16	3	F	27	27	
4	M	3	3	2	13	14	4	F	0	0	0	13	13	4	F	13	14	
5	M	0	0	0	24	22	5	F	0	2	2	22	21	5	F	15	15	
6	M	1	1	2	18	12	6	M	3	3	0	12	14	6	M	18	16	
7	M	2	2	2	17	8	7	M	0	0	0	15	10	7	M	17	18	
8	F	1	2	2	15	8	8	M	2	2	2	18	18	8	F	12	12	
9	M	0	2	1	22	13	9	F	2	2	0	12	4	9	F	12	12	
10	F	2	2	2	19	20	10	F	1	1	1	12	12	10	M	19	18	
11	F	1	2	2	12	7	11	M	2	2	2	12	10	11	F	22	19	
12	M	3	3	3	25	25	12	F	1	1	1	24	25	12	F	13	11	
13	M	1	1	2	12	8	13	F	0	1	1	24	23	13	M	12	18	
14	F	1	1	1	13	9	14	M	0	0	3	17	17	14	M	12	12	
15	M	0	0	3	15	10	15	M	1	1	1	15	12	15	F	15	16	
16	M	2	2	2	15	9	16	M	1	1	2	12	13	16	F	19	18	
17	F	1	2	2	12	14	17	F	0	0	1	12	8	17	F	15	18	
18	M	1	2	2	15	8	18	F	0	1	1	13	11	18	M	12	8	
19	F	1	1	2	17	9	19	M	1	2	2	14	16	19	M	12	12	
20	F	2	2	2	18	10	20	F	1	1	1	14	15	20	M	16	15	
Average					16,55	12,1							15,5	14,4				

Table 1: N = numbers of the experimental subjects
M/F = Male/Female
T5, T6, T7 = Nerve reflex points of rami dorsales T5,T6,T7
L1, L2, L3 = Nerve reflex points of rami dorsales L1,L2,L3
0-1-2-3 = length of time for pain on the nerve reflex point
W1 = EMG value in μV for the first measurement
W2 = EMG value in μV for the second measurement

- **Group A:** The average decrease of EMG value after pressing reflex points was $5,5 \mu\text{V}$.

A = $5,5$ (graphic 1)

The maximal decrease = $9\mu\text{V}$ (n17); the minimal decrease = $1 \mu\text{V}$.

Subject n10 shows an increase of $1\mu\text{V}$ and n17 an increase of $2 \mu\text{V}$.

(graphic 2)

- **Group B:** On the average, the EMG values are showing a very light decrease:

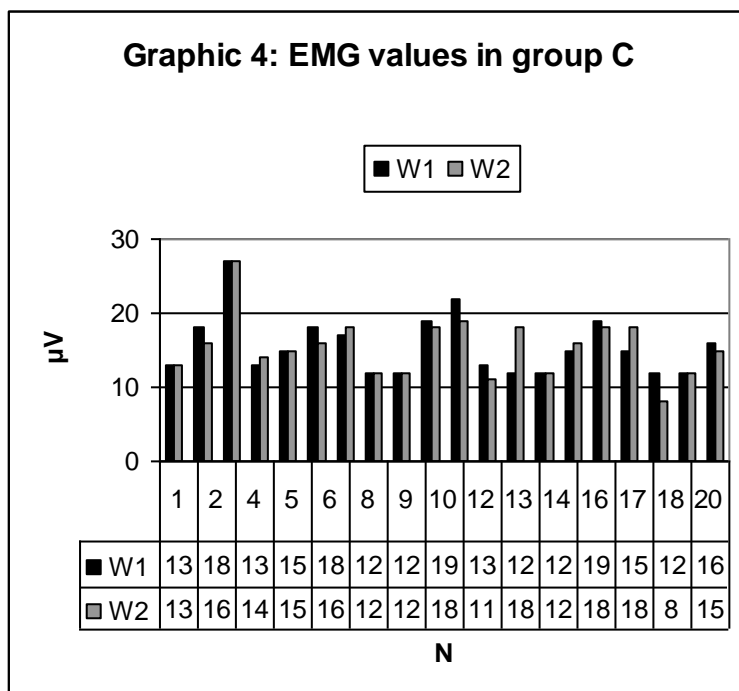
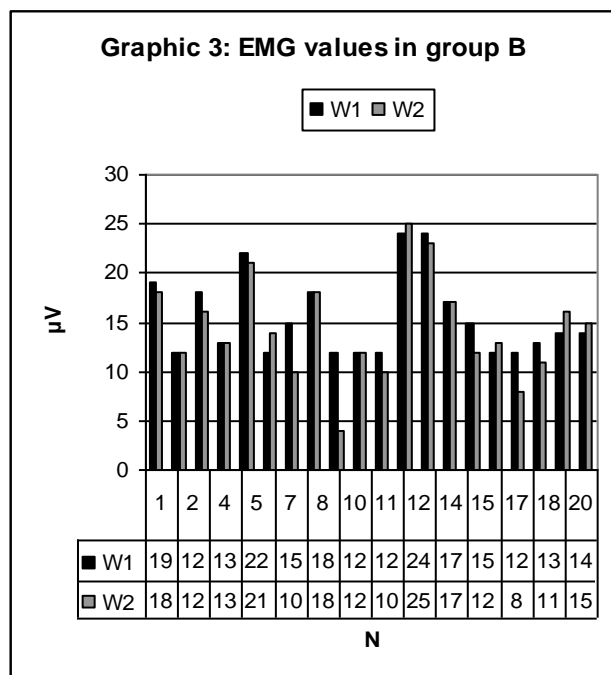
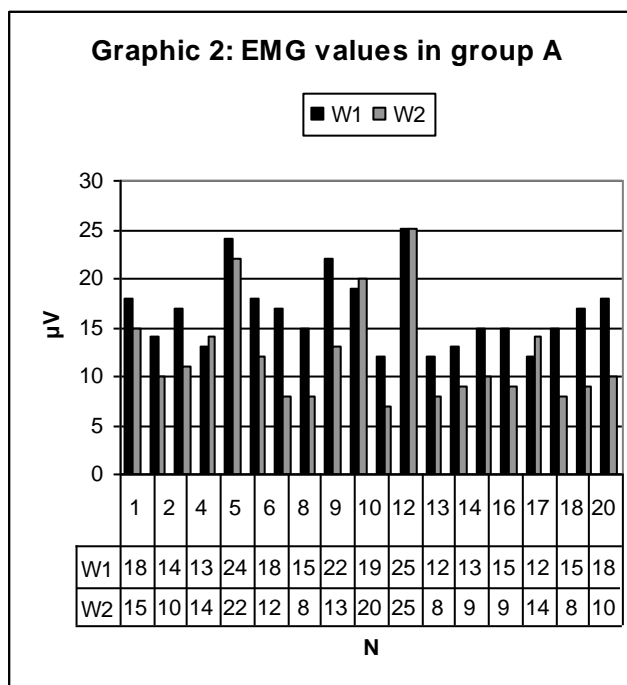
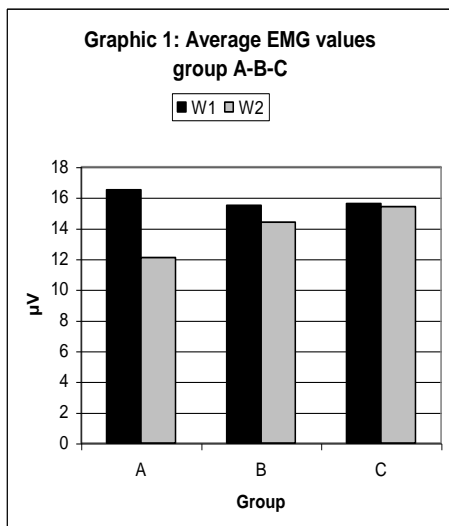
B = 0 (graphic 1)

Maximal decrease = $8\mu\text{V}$ (n: 9); minimal decrease = $1\mu\text{V}$ (n: 1, 2).

5 subjects (1/4) showed an increase of W2 versus W1 with respectively $1 \mu\text{V}$ (n: 12, 16, 20) and $2 \mu\text{V}$ (n: 6, 19) .

(graphic 3)

- **Group C:** Average decrease = 0,5 μV .
 $C = 0,5$ (graphic 1)
 Maximal decrease = 4 μV (n: 18); minimal decrease = 1 μV (n: 10, 20).
 4 subjects showed an increase with respectively 1 μV (n: 7, 4, 15), 3 μV (n: 17) en 6 μV (n: 13). (graphic 4)



Regarding the control group C, the experimental group A shows an important decrease of muscle tone after pressing nerve reflex points.

$$(A - C = 5)$$

$$\text{Pearson} = 0.740289$$

Regarding group C EMG values in group B showed a light increase of muscle tone of $5 \mu\text{V}$

$$(B - C = -0,5)$$

3.2. Discussion.

Although the population in this research is small, tendency's can be observed.

In the experimental group a relation exists between the pressing of nerve reflex points of rami dorsales T5, T6, T7 and the decrease of EMG-voltage of the muscles.

This decrease can not be observed in the placebo group neither in the control group.

The pressure of well defined points at the foot, as described in the experiment, gives the possibility to decrease the tone of the target muscles.

This result is the more remarkable since the pressure of the reflex points is accompanied with pain.. Pain can raise the tone of muscles.

To define the points at the foot as "*reflex*" points" seems to be justified. A clear and instantly decrease of muscle tone is done by pressuring points on a distinct distance of the target tissue. Irritating the point at the foot is causing a "*reflectory*" change in the target tissue. The addition of "*nerve*" reflex point can also be justified. Decrease of paravertebral muscle tone must be started by a decrease of frequency of firing of rami dorsales, responsible for the innervation. After all, decrease or increase of muscle tone is in direct relation to the fire frequency of A- alfa-, béta-, and gamma-neurons.^[15]

The term "*nerve reflex zone at the foot*" circumscribes the reflex points that have a direct connection with a target nerve or nerve structure.

This experiment also indicates that nerve reflex points at the foot must have a well defined location on the foot skeleton. Pressure of points that are thought to be reflex points of rami dorsales of L1, L2 and L3 don't cause a decrease of muscle tone although the pressure technique and the pressure force was the same in the experimental group and in the placebo group.

In this research the authors also checked if there is a relationship between the time of the pain felt by pressuring a nerve reflex zone and the raise of muscle tone. The correlation between the average duration times of pain on nerve reflex points en W1 was calculated. No significant correlation was found, either in group A ($r= 0,127$), or in group B ($r= 0,041$). In Manual Neurotherapy one accepts the hypotheses that the level of nocisensoric input is correlated with the time of pain.

Until today, this hypotheses is not verified.

The most important conclusions of this research can be recapitulated in 3 points.

1. Pressuring well defined and well located points at the foot has an influence on the tone of paravertebral thoracic muscles.
2. The expression "*nerve reflex point*" seems to be justified since there is a relationship between the pressured point and the attitude of the target nerve or nerve structure.
3. There is no correlation between the time of pain felt at the nerve reflex zone and the level of muscle tone.

4. Conclusions.

Until today, Manual Neurotherapy leans on empirical findings.

The used massage techniques differ from the classical techniques in physiotherapy and so the manipulation techniques differ from the manipulations used in Manual Therapy. Still a certain extrapolation for the value of this techniques can be made as described in many experiments.

The use of nerve reflex points at the foot remains a point of discussion since no valuable studies on nerve reflex points at the foot were performed until today.

This experiment shows clearly that the use of nerve reflex points can have a therapeutic influence. Although this study is too restricted in its population to take definitive conclusions. Many questions remain to be resolved.

So this study gives no answer if these results can be reflected on other target tissues like nerve reflex points for the autonomous system. Research is also necessary to evaluate if a different technique of pressing nerve reflex points (for instance: repetitive pressing instead of static) has a different effect on the innervation. Concerning the location of the nerve reflex points, profound studies should be performed to verify the today's hypotheses.

The authors hope that this experiment reveals enough indications for taking nerve reflex points seriously and for stimulating further experiences on larger scales. On the longer term these experiences can lead to a grounded hypotheses about the way nerve reflex points work.

References

- [1] Froneberg, W., 1984, Reflexzonentherapie, Eigen Verlag
- [2] Eunice D. Ingham, 1966, Stories the feet can tell, Diffusion Prologue Quebec
- [3] Marquardt H., 1994, Praktisches Lehrbuch der Reflexzonentherapie am Fuss, Hippokrates Verlag GmbH Stuttgart
- [4] Froneberg W; Fabian G, 1992, Manuelle Neurotherapie, Haug Verlag GmbH & Co., Heidelberg
- [5] Hannemann, H., 1987, Voetreflextherapie, Zelf- en partnerbehandeling, Naarden, Strengholt
- [6] Kesselring, A., Fussreflexzonenmassage, Schweiz Med. Wochenshr., Suppl. 62, (1994), p: 88-93
- [7] Oleson, T., Flocco, W., Randomized controlled study of premenstrual symptoms treated with ear, hand and foot reflexology, Obstetrics and Gynaecology, 82, (1993), p: 906-911
- [8] Omura, Y., Accurate localization of organ representation areas on the feet and hand using the bi-digital O-ring test resonance phenomenon: its clinical implication in diagnosis and treatment., Acupuncture and Electro Therapeutics Research, 19, (1992), p: 153-194
- [9] Visbeen, M.A., Oppervlakte electromyografie bewijst effectiviteit van voetreflexologie, Humaniter: Tijdschrift van de Werkgroep voor Manuele Neurotherapie, (1992), p: 5-9
- [10] Benninghoff, 1985, Makroskopische und Mikroskopische Anatomie des Menschen Band 1-2-3, Urban & Schwarzenberg München-Wien-Baltimore
- [11] Hermens, H.J., Boon, K.L., Zilvold, G., The clinical use of surface EMG., Electromyography and Clinical Neurophysiology, 24, 1984, p:243-265
- [12] Bogduk N., Towny L.T., 1991, Clinical Anatomy of the Lumbar Spine, Churchill Livingstone Melbourne
- [13] Bogduk, N., Innervation of the vertebral column, Australian J. Physio, 31, 1985, p: 89

Correspondence : abeyema@skynet.be