

Effect of bioadaptive impulse therapy on pain and the autonomic nervous system during physiotherapeutic treatment using the MedKey

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Scientific background

- HRV is a biomarker for specific pain-related diseases (Lerma et al., 2011) and a outcome measure for the relief of pain due to therapeutic interventions (Storella et al., 1999; Zhang et al., 2006; Toro-Velasco et al., 2009).
- Patients with chronic pain show a reduction in HRV and baroreflex sensibility due to changes in efferent sympathetic and parasympathetic cardiac activity, which shift the balance to a sympathetic tone prevalence related to catecholamine release [Nielsen et al., 2014; Broehl et al., 2005].
- Higher parasympathetic activity was associated with better self-regulation capacities and, accordingly, a higher pain inhibition capacity (Forte et al., 2022).

Aim of the study

Aim of the study is to examine the extent to which treatments with adaptively regulated impulse therapy have an influence on the cardiovascular system, autonomic nervous system, cardiac autonomic regulation and existing pain during physiotherapy treatments.

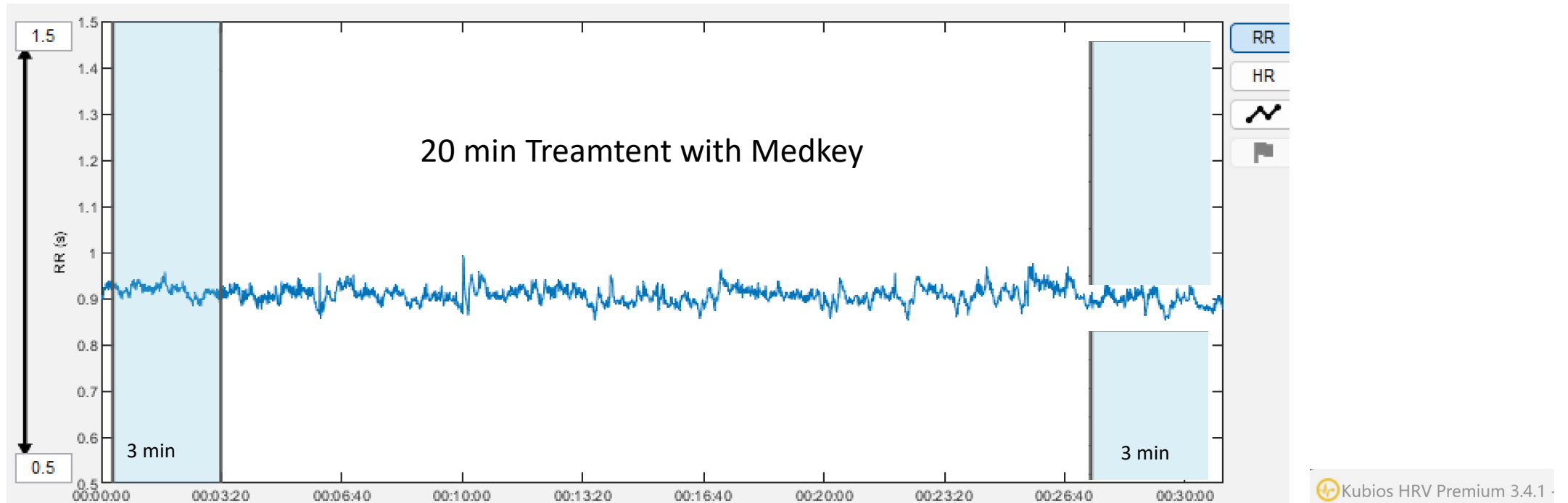
Method

- The basis of the examination is the continuous measurement of the heart rate (RR interval) and the determination of heart rate variability. The data was collected while lying down using a special, ECG-accurate chest strap and a specially designed app (HRV-Elite) before, during and after treatment.
- Patients (m/f/d) with the appropriate indication were selected for this. The treatments took place twice a week for a period of 3 weeks - a total of 6 treatments.

Method

- A continuous treatment protocol was used for 8 patient over the treatment period. The following data was collected in addition to the RR measurement:
- VAS pain level 1-10 pre-post per application at rest and during joint movement
Dysfunction level 1-10 pre-post per application
- Gender
- Age
- Weight
- Duration of complaint since onset of complaint
- Complaint location
- Duration of treatment per application
- Medication taken

Data Analysis



Time-Domain Results

Variable	Value	Units
Mean RR*	916.37	ms
SDNN	7.3643	ms
Mean HR*	65.476	beats/min
STD HR	0.52629	beats/min
Min HR	63.640	beats/min
Max HR	67.265	beats/min
RMSSD	9.3155	ms
Stress index	34.089	



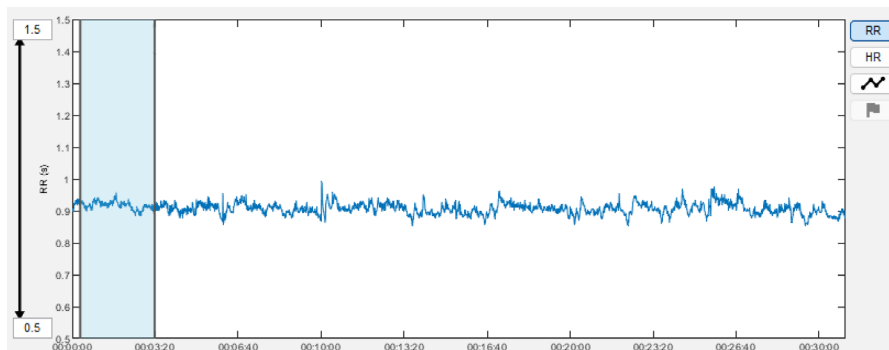
Time-Domain Results

Variable	Value	Units
Mean RR*	895.61	ms
SDNN	10.624	ms
Mean HR*	66.993	beats/min
STD HR	0.79486	beats/min
Min HR	64.753	beats/min
Max HR	69.865	beats/min
RMSSD	10.856	ms
Stress index	24.018	

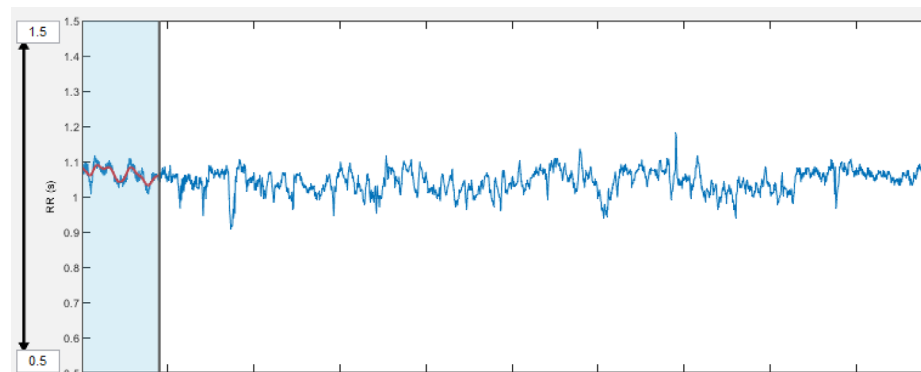
Standardized MedKey – Sessions

Subject 6

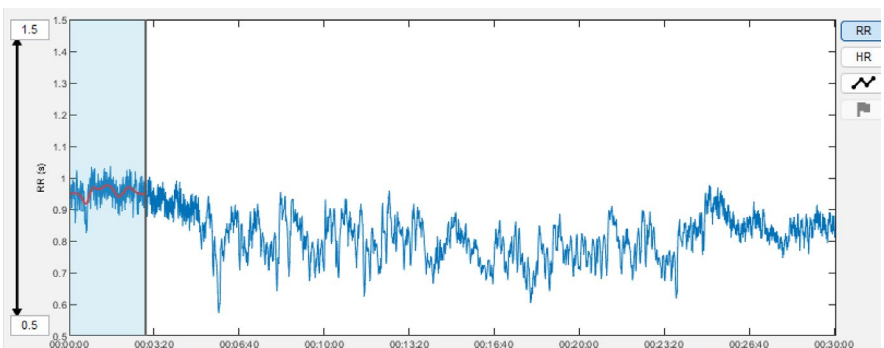
Treatment 1



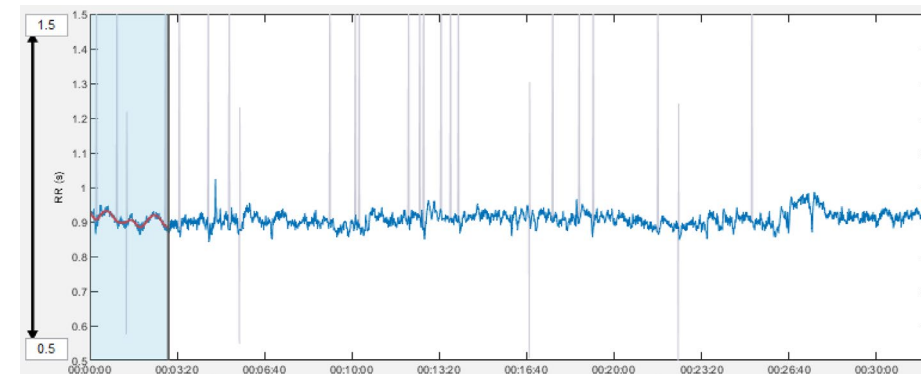
Treatment 4



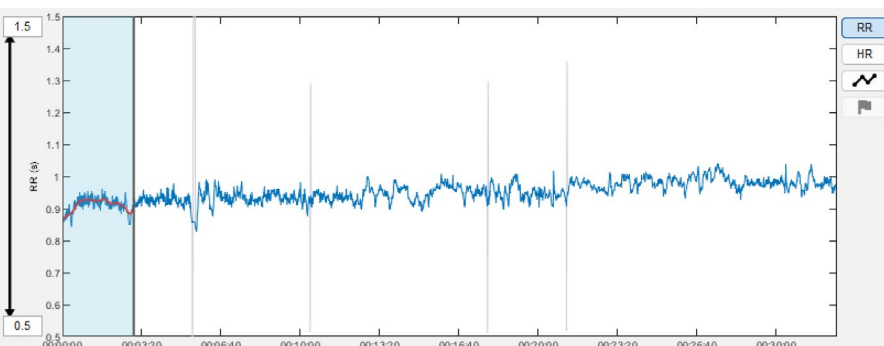
Treatment 2



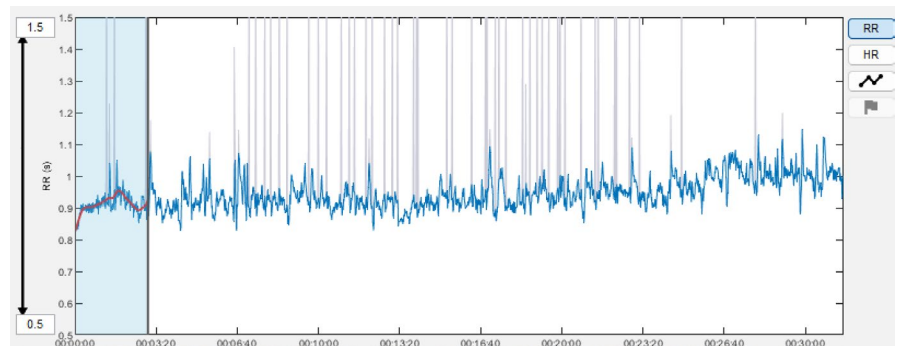
Treatment 5



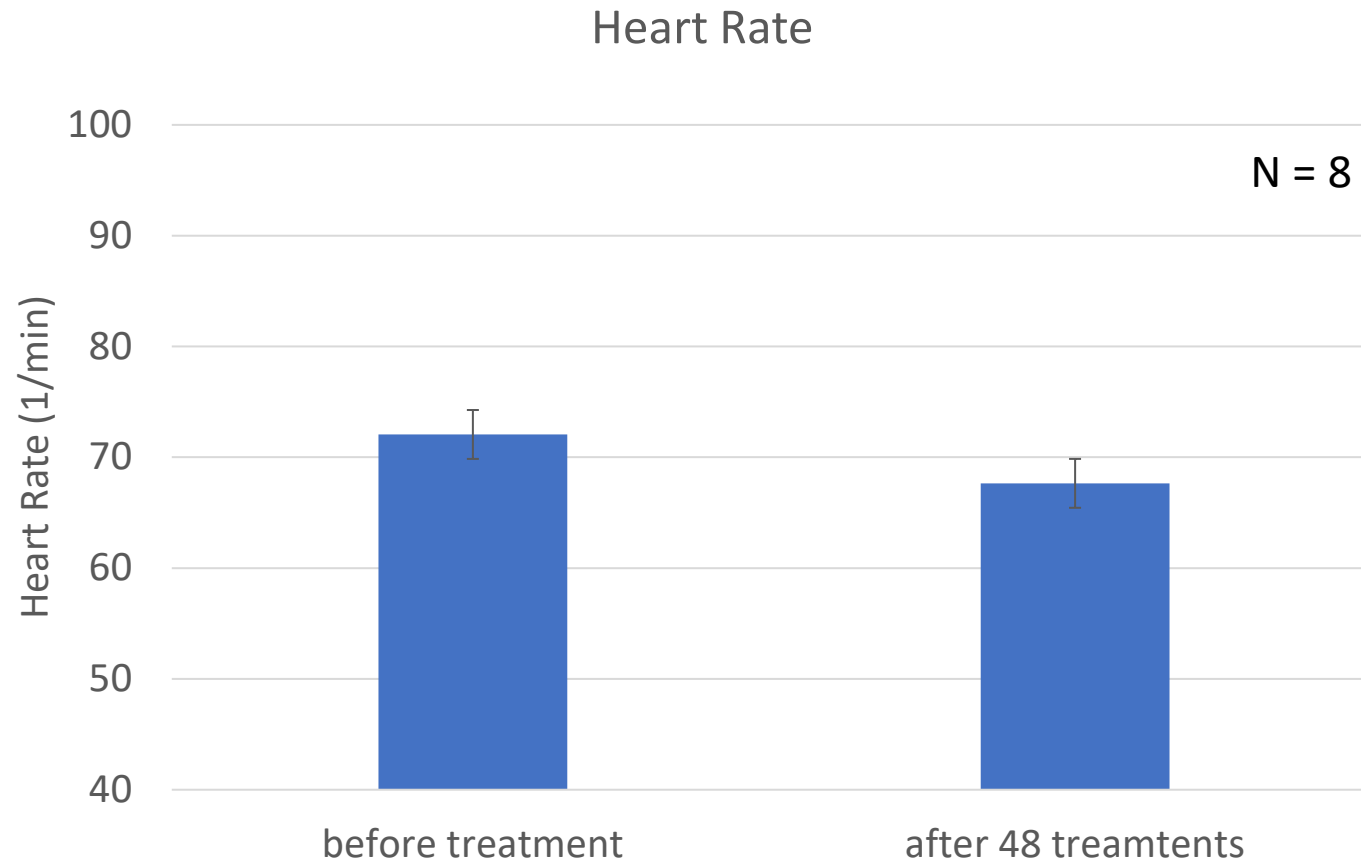
Treatment 3



Treatment 6

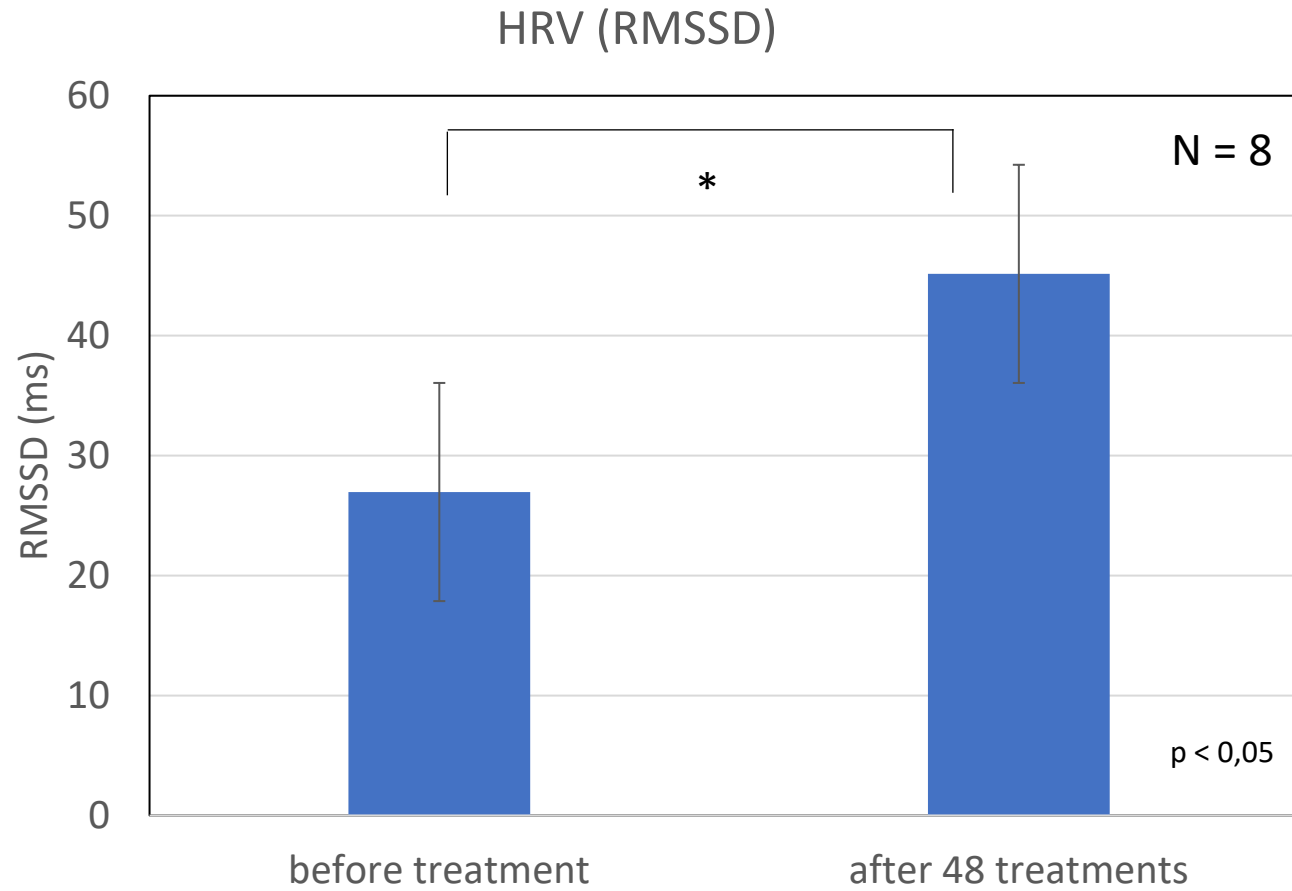


Heart Rate in Supine Position



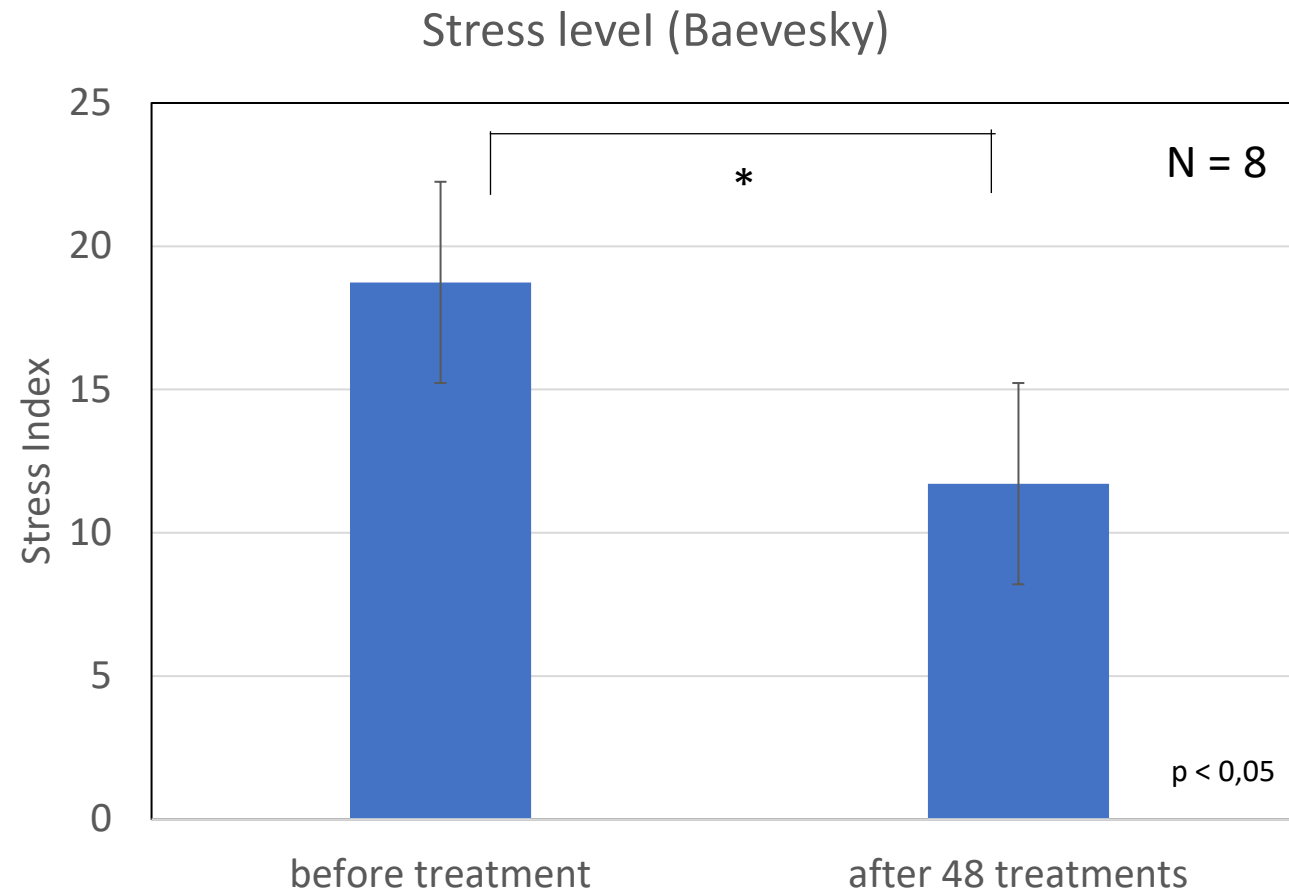
Measurement 3 min in supine position

Significant Increase Vagal Activity



Measurement 3 min in supine position

Signifcant Decrease Stress Level



Measurement 3 min in supine position before treatment

Effect of the Medkey Sessions on pain and stress

All treatments in which the patients stated that they were in pain before the treatment were evaluated.

Results:

1. For all treatments, the 20 min Medkey Session achieved a reduction in pain for all test subjects by an average of 3 points on the VAS-Skala (0-10).
2. Stress level decrease sig. from 14,8 to 13,2 ($p < 0,05$)