

Research Report. Study 2003/2004

English translation

SPOREG / hhp massage couch / 2003-2004

Translation note: the main body of the report, key numerical data and study structure have been translated. Technical abbreviations from the statistical tables have been retained to avoid altering analytical parameters.

Research report

Study 2003/2004. Part I: cross-sectional analysis. Part II: longitudinal analysis.

Topic: investigation of the physiological effects of the oscillating massage couch manufactured by hhp on the human organism.

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0. Introduction

- In 2002 more than 50% of all employed people suffered from back pain.
- 60-80% of Germans experience problems involving the spine.
- The typical back-pain patient is 30-55 years old, with a growing tendency toward younger people.
- Approximately 60,000 people in Germany undergo surgery for intervertebral-disc problems each year.
- Around 20% of employees report sick because of back pain; after common colds, back complaints are the second most frequent reason for absence from work.

Back pain has become a widespread public-health problem and contributes substantially to workplace absence. Since the multiple causes of back problems cannot be completely eliminated in society, it appears advisable, from a public-health perspective, to address at least the elimination of muscular tension.

Social and economic conditions cause people to embody increasing levels of tension, which are fundamentally of emotional origin and are intensified by lack of movement. People sit too much. Over the last 15 years this phenomenon has become increasingly visible. Dysfunctions triggered by emotional pressure are associated first with beginning restriction of spinal mobility, then with muscular tension, which ultimately manifests as chronic back pain.

1. Problem background

Users of the hhp massage couch reported many positive effects: improved circulation, relaxation of the back muscles, pain reduction and resolution of lymphatic congestion.

Insufficient blood flow to the back muscles, and the associated poorer supply of the entire back complex with nutrients important for cellular metabolism, can lead to chronic undernourishment of essential tissue structures. If this condition persists for a long time, both tissue elasticity and muscular contractility suffer.

Myogeloses in the form of multiple hardened strands are direct consequences and are a preliminary stage of deteriorating trunk statics. This is usually reflected in insufficiency of the back extensors or in atrophy of the ventral trunk muscles.

Based on positive patient feedback and the causal chain discussed above, the physiological effects of the application of oscillating vibrations on the human organism were investigated as part of a broad scientific study.

2. Research questions and hypotheses

Question 1: Can the effects of the oscillating vibrations of the hhp massage couch improve pain symptoms in patients with back pain?

Hypothesis 1: A 15-minute application of the hhp massage couch leads to an immediate improvement in the complaint pattern in patients with back pain.

Question 2: Can regular application of the oscillating vibrations of the hhp massage couch lead to lasting improvement of pain symptoms in patients with back pain?

Hypothesis 2: Regular application of the hhp massage couch leads to lasting improvement of the complaint pattern in patients with back pain.

3. Methodology

3.1 Study design: cross-sectional analysis

Within a modular scientific research design, 40 randomly selected patients with back pain were first randomized into two subgroups of 20 subjects each and examined in the fourth quarter of 2003.

The control group received no active application. The second group received vibration and red-light application. The hhp massage couch was used according to a defined program, "lymph-flow regulation - muscle relaxation," for a total duration of at least 15 minutes, in accordance with the manufacturer's recommendations.

Before and after the intervention, subjective pain perception, body-fluid distribution, trunk mobility and resting tone of the back muscles were assessed.

3.1.2 Longitudinal analysis

On the basis of the data collected in the cross-sectional analysis, the authors considered it reasonable to use the existing results for a longitudinal study. The immediate effects of a 15-minute application of the hhp massage couch are an important step, but are not sufficient on their own to demonstrate positive physiological changes.

In order to establish the couch in the medical-therapeutic field, evidence of a long-term therapeutic effect is required. Therefore, the longitudinal study followed the same subjects for 4 weeks with 3 sessions per week of 15 minutes each. In the authors' view, good results can be achieved after 12 therapy units over 4 weeks.

3.2 Parameterization

Subjective pain perception was recorded using a 0-100 score sheet. A value of 0 indicated no pain and 100 indicated severe pain. The patient marked a vertical line on a 10 cm field before and after application.

Body-fluid distribution was analyzed using the Body Composition Analyzer InBody 3.0 by Biospace, assessing intracellular, extracellular and segmental fluid distribution.

Spinal mobility was analyzed in flexion, extension, left/right lateral flexion and left/right rotation under standardized conditions using the Schnell biomechanical functional analysis system for the spine.

Muscle innervation was recorded using electromyographic signals from bipolar surface electrodes at representative points of the back muscles, summarized as an EMG mapping. Mean activation frequency (MFRQ) and amplitude (RMS) were analyzed.

4. Presentation of results

4.1 Cross-sectional analysis

The anthropometric data showed that random assignment to the groups was successful. No statistically significant differences were found between the subgroups for age, height, weight and body-fat percentage; the significance values were consistently above the 5% error-probability level.

For subjective pain, the total group showed a reduction of 14.8 points. In the placebo group there was a slight, non-significant reduction of 2.45 points. In the active group, the reduction was substantially larger and statistically significant.

Segmental body-fluid parameters were measured to detect possible changes in lymphatic or blood circulation. The placebo group showed only minor, non-significant differences. In the active group, certain fluid-distribution changes were more distinct; the calculated difference values indicated redistribution of fluid from the lower extremities toward the trunk, which the authors interpret as being compatible with a lymph-drainage effect.

For spinal mobility, the calculated trunk-mobility difference values of the active group were highly significant. The authors therefore postulate a clear increase in spinal mobility after 15 minutes of massage-couch application. The slight increase in spinal mobility in the placebo group was not significant.

For muscle innervation, the active group showed, after 15 minutes of oscillation massage, a significant reduction in mean activation frequency by approximately 2.95 Hz and a slight reduction in amplitude by approximately 0.12 mV. Both parameters indicate muscle relaxation. In the group comparison, the DMFRQ parameter was statistically significant.

Final assessment of the cross-sectional analysis

On the basis of the cross-sectional results, the authors consider it scientifically demonstrated that the oscillating vibrations of the hhp massage couch improve pain symptoms in patients with back pain. Question 1 is answered in the affirmative and hypothesis H1 is accepted.

In addition to subjective pain perception, physiologically measurable parameters - spinal mobility, innervation characteristics of the back muscles and fluid redistribution - responded significantly to oscillation massage.

Part II. Longitudinal analysis

The immediate positive effects of a 15-minute hhp massage-couch application demonstrated in the cross-sectional study are interpreted as evidence of the physiological effects of oscillating vibration on humans. To verify a long-term therapeutic effect, the subjects were followed for 4 weeks with regular application of the couch 3 times per week for 15 minutes each.

4.2.1 Pain perception

In the placebo group, pain perception decreased by 7.80 measurement points. In the active group, the reduction was approximately 28.45 points and therefore much larger. After a 4-week application period, the subjective pain perception of back-pain patients can be reduced.

4.2.2 Body-fluid distribution

As in the cross-sectional study, subjects were examined with the InBody analyzer before and after the 4-week period. In both subgroups, only minor shifts in the intracellular and extracellular compartments were observed. However, the calculated difference parameters in the active group were more pronounced and were interpreted by the authors as a possible lymph-drainage effect.

4.2.3 Spinal mobility

Biomechanical functional analyses were performed before and after hhp couch application and after the 4-week period. In the active group, the difference values for trunk mobility were consistently highly significant. The authors postulate a marked increase in spinal mobility after 4 weeks of massage-couch application.

4.2.4 Muscle innervation

Surface EMG measurements were taken at four representative points of the back muscles. In the placebo group, changes were minimal. In the active group, the 4-week differences were larger both in the raw data and in the calculated difference values. The group differences were statistically significant; the authors therefore postulate a positive effect on muscular tension in the sense of relaxation.

5. Interpretation of results

The authors interpret the data as confirmation that oscillation massage has a positive effect at several levels: subjective pain, spinal mobility, muscular relaxation and fluid redistribution. The short-term and 4-week effects are viewed as mutually reinforcing.

For pain, the more pronounced reduction occurred in the active group. For body fluids, the clearest effect appeared in the difference values, which may correspond to stimulation of lymphatic drainage. For spinal mobility, the result was particularly consistent: the active group demonstrated significant improvement in mobility. For EMG parameters, the reduction in activation frequency suggests relaxation of the back muscles.

6. Summary and outlook

Based on the results of the cross-sectional and longitudinal analyses, the authors consider it scientifically demonstrated that the oscillating vibrations of the hhp massage couch improve pain symptoms in back-pain patients. The increase in spinal mobility is particularly emphasized. Muscular tensions present at the beginning of the study, expressed as high neuronal activity, decreased significantly.

In addition, body-fluid distribution was significantly stimulated by the effect of oscillation massage. The consistently positive results occurred both immediately after application in the before/after comparison and over a 4-week application period. Accordingly, the authors speak of a positive therapeutic effect of the hhp massage couch.

The authors see areas of application for oscillation massage in regeneration-promoting measures, preventive measures to avoid the complaint patterns described above, and rehabilitation for patients with many types of back complaints.

Final statements of the report

- A 15-minute application of the hhp massage couch leads to immediate improvement in the complaint pattern in patients with back pain.
- Regular application of the hhp massage couch leads to lasting improvement in the complaint pattern in patients with back pain.
- Subjective pain perception is reduced.

- Spinal mobility increases.
- Muscle tension decreases.
- The body-fluid system is positively stimulated.

The study was conducted by Dipl. Sportwiss. Dr. phil. Roland Stutz and Dipl. Sportlehrer Reinhard Gebel.

Study design

Study design

Group	N	Intervention	Measurement points
Placebo/control	20	15 min on manipulated massage couch / placebo condition	Before and after; later 4-week comparison
Active/effect group	20	hhp massage couch program: lymph-flow regulation and muscle relaxation, at least 15 min	Before and after; later 4-week comparison

Anthropometric data of the total group

Parameter	N	Minimum	Maximum	Mean	SD
Age	40	27	74	49.90	13.083
Height, cm	40	169.0	193	180.73	6.876
Weight, kg	40	62.9	115.1	84.465	10.5752
Body fat, %	40	9.0	34.1	20.260	5.6055

Key results

Outcome	Immediate / cross-sectional result	4-week / longitudinal result
Subjective pain	Active group showed a marked reduction; placebo only a slight non-significant reduction.	Active group pain score reduction about 28.45 points; placebo about 7.80 points.
Spinal mobility	Calculated trunk-mobility difference values were highly significant in the active group.	Calculated difference values for trunk mobility remained highly significant.
Muscle innervation	Mean activation frequency decreased by about 2.95 Hz; amplitude decreased slightly.	Group differences in calculated EMG differences remained statistically meaningful.
Body-fluid distribution	Raw data showed only small shifts; calculated differences indicated redistribution toward the trunk.	Differences were interpreted by the authors as compatible with a lymph-drainage effect.

Source

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