

Master Thesis by Julia Söll (M.Sc.): Effects of extension mobilization of the thoracic spine using the BALLance© method on handball players.

Many handball players show physiotherapeutic findings of a reversible postural deficit, in the form of a hunchback. So far, there has been no investigation on the biomechanical mode of action of an extension mobilization of the thoracic spine with the BALLance©-method on postural control. Therefore, the effect of an extension mobilization of the thoracic spine with the BALLance©-method on the postural control of healthy handball players is to be investigated in this study.

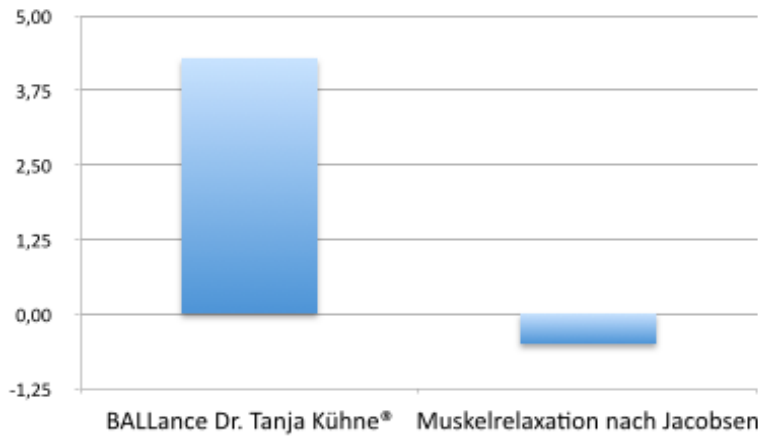
30 handball players from the Württemberg League and Handball-Baden-Württemberg-Oberliga participated in this randomized controlled pilot study. In the intervention group, 15 handball players received an extension treatment of the thoracic spine with the BALLance©-method ©. In the control group, 15 handball players were treated with Jacobsen's progressive muscle relaxation. Postural data on postural orientation (height while sitting, angle of curvature of the thoracic and lumbar spine) and postural stability (amplitude movement in the anterior-posterior direction and oscillation frequency) were recorded and evaluated comparatively immediately before (t_1) and after (t_2) the 30-minute interventions and in the follow-up after 24 hours (t_3).

The results of the study prove that extension mobilization of the thoracic spine with the BALLance©-method has a positive effect on postural control. A highly significant interaction effect for the thoracic kyphosis angle ($p < 0,01$) could be determined on the one hand, with a highly significant and significant interaction effect for the lumbar lordosis angle ($p < 0,01$ and $p < 0,05$, respectively) being determined on the other. In addition, a highly significant reduced oscillation frequency was observed in both groups between t_1 vs. t_2 and between t_1 and t_3 ($p < 0,01$). Furthermore, the follow-up shows a highly significant improvement in subjective back pain perception in the BALLance©-group compared to the muscle relaxation group ($p < 0,01$).

A preventive BALLance©-application in handball appears to be an effective and operable measure to show improvements in postural control, especially in the postural orientation of the thoracic and lumbar spine. Subsequent studies in the form of long-term studies with higher sample sizes are necessary to assess the long-term effects of this treatment on postural control.

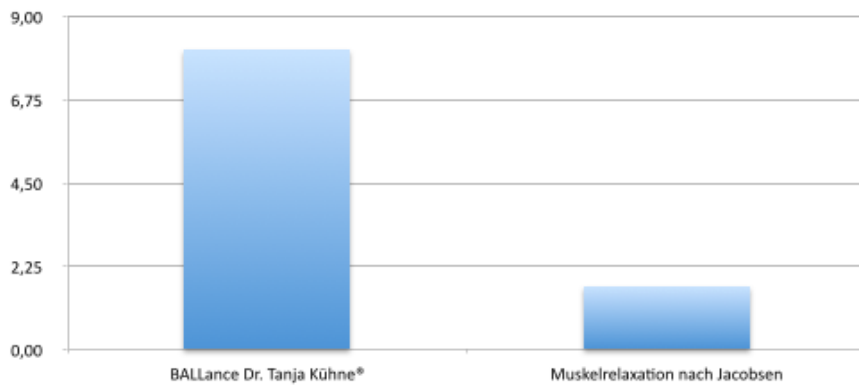
The following two figures show the comparison of the effects on the thoracic spine between the BALLance Method and a muscle relaxation program by Jacobsen. Results: The lordosis of the patients has been decreased by almost 4° and the kyphosis by almost 8° after performing the BALLance Method.

Change of LWS Lordosis after 30 min. in degrees (n=15)



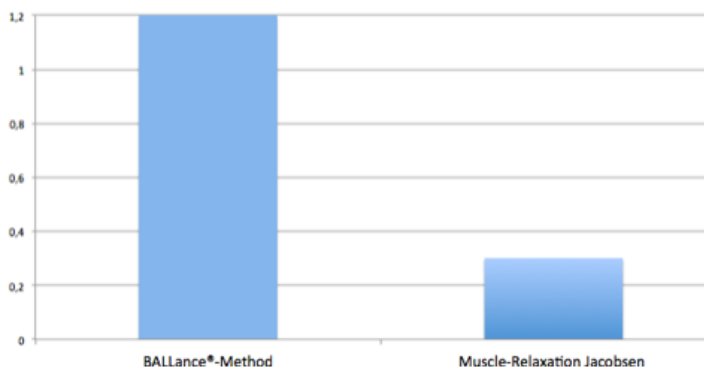
Lordosis

Change Kyphosis after 30 Min. in degrees (n=15)



Kyphosis

Ø Change of body height after 30 min. in cm (n=15)



Additionally, the average body height was increased by 1,2 cm.

Master Thesis David Cornely (M.Sc.): Functionality of the BALLance Method with unspecific chronic back pain in comparison to a traditional stabilisation program.

The consequences of lower back pain burden the German economic system. Approximately 85 % of the back pain patients are classified as suffering from chronic, nonspecific lower back pain (cLBP) and, therefore, cLBP has been giving in focus within research. It is well known that exercises, which aim at activating the stabilizing muscles of the spine, are effective as a treatment of cLBP and are nowadays considered to be best-practice. This type of training reduces pain and improves functioning in daily life. However, the BALLance®-method has recently been introduced as a potential, alternative treatment method for cLBP . In contrast to stabilizing exercises the BALLance®-therapy focuses on calm mobilization techniques of the spine.

Objectives: Therefore, the objective of this study was to find out whether the BALLance®-method is as effective in reducing pain and disabilities in every-day live as stabilizing exercises.

Methods: Thirty-two subjects with cLBP (> three months of pain) were randomized to one of the two following treatment methods, each involving eight treatments over four weeks: 1) STABI-group (n = 16) involving 45 minutes of supervised stabilizing exercises or 2) BALL-group (n = 16) involving 45 minutes of supervised BALLance®-exercises. Outcome measures recorded self-rated pain and disability during daily life (Oswestry- and Roland-and-Morris-questionnaire), psychological distress (FABQ-questionnaire and DASS-scale), flexibility (finger-to-floor-distance test) and muscle endurance (isometric plank and side-plank). Data were recorded at baseline, after four weeks of intervention and after four weeks of follow-up.

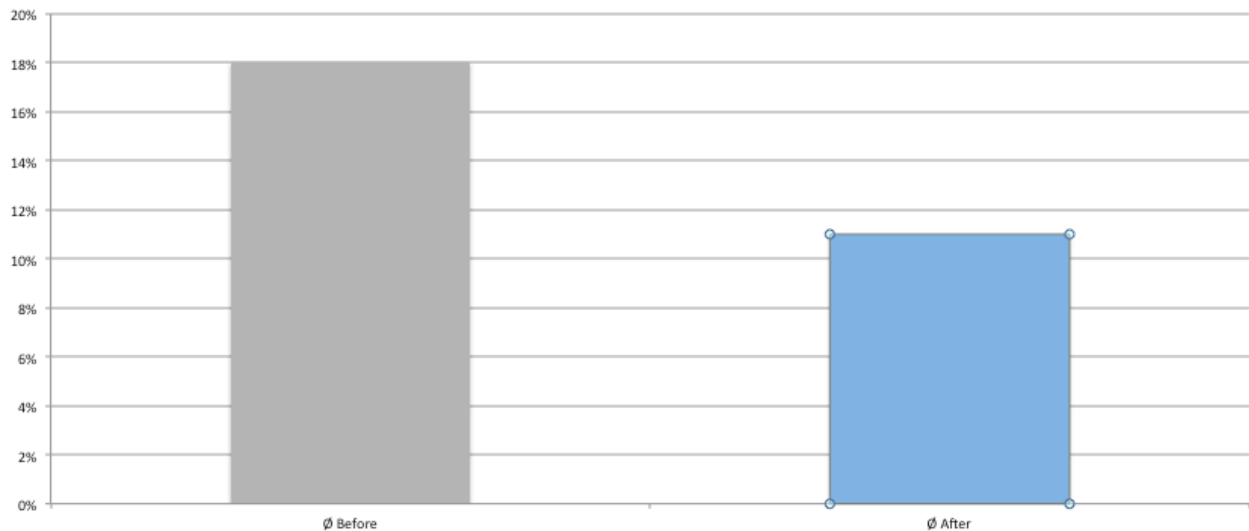
Results: For pain and disability, there were no differences between groups (Oswestry: $P = 0,62$ and RolandMorris: $P = 0,74$), although both groups did improve significantly over time. For the flexibility measures, there were no significant differences between the groups ($P = 0,45$) and no group improved significantly over time, although there was a tendency of the BALL-group to improve ($P = 0,06$). However, the STABI-group did significantly improve their endurance performance (plank and side-plank: $P < 0,001$) and the difference to the BALL-group in the parameter endurance was significant as well (plank: $P = 0,04$; side-plank_R: $P = 0,006$; side-plank_L: $P = 0,001$). Both interventions did not influence psychological distress.

Discussion: Both interventions reduced pain and functioning during daily life, although each group had different impact on physiotherapeutic outcome measures. Both therapies have different strengths and qualities and it, therefore, remains optional which therapy to prefer. The effect of the BALLance®-method remains unclear and the best training parameters for stabilizing exercise still need to be validated. This study established a good baseline for future follow-up studies in this field. The author intentionally constructed a practical study design, knowing that certain methodological standardizations were not applicable.

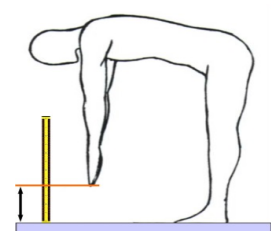
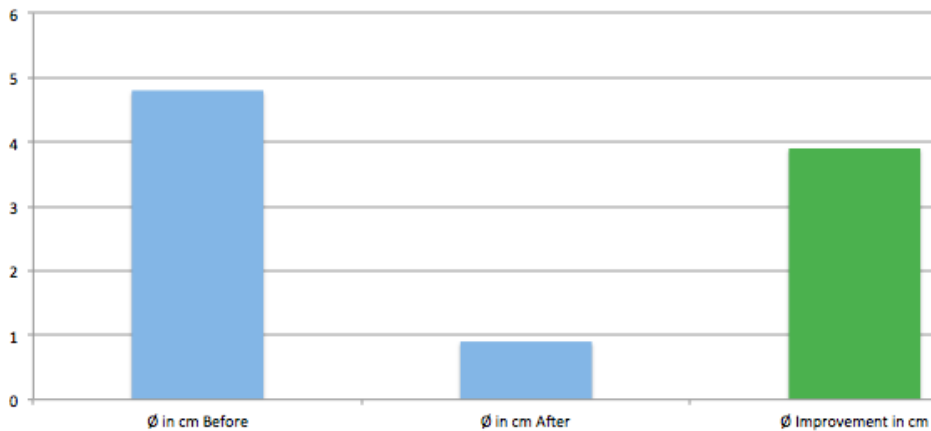
Conclusion: The BALLance®-method can be used as an alternative treatment for cLBP, because with regard to the reduction of pain and disability, it is as effective as stabilizing exercise.

The following two figures show the effects of the BALLance Method measured with the Oswestry-Disability-Index (ODI) and the finger bottom difference. The ODI is a proven Index of self assessment which is showing the subjective sensation of backpain with regard to all day life situations. According to the results the backpain has been reduced by more than 7 %, which indicates a relative reduction of 39,89%! The finger bottom difference was reduced by 4 cm.

Oswestry-Disability-Index (ODI) *: Sensation of pain between 0 - 100 %
(n = 14; t = 4 weeks).



Finger-Bottom-Measurement after completion of the BALLance®-Method
(n = 14; t = 4 weeks)



Bachelor Thesis by Celina Bischof (B.Sc.): Empirical examination of the functionality of the BALLance Method with regard to the Cardio Stress Index.

Due to the additive effects of stress and back pain and the current disease situation of related mental and physical diseases, the prevention and management of such diseases has increasingly moved into research focus. With regard to this background, the main objective of this study was to clarify the question of whether the Cardio Stress Index (CSI) of the human body changes positively when a training program according to the BALLance® method of Dr. Tanja Kühne is conducted. In addition, positive changes in subjective parameters, such as stress, discomfort and body size were tested.

In addition to the derivation of the Cardio Stress Index, the study also includes the definition of stress and the relationship between stress and back pain which is needed to make an interaction clear. Based on the state of knowledge, an investigation of the BALLance® method with focus on the CSI has been performed. It includes a pre- and post-examination of the 20 test persons, in which subjective parameters (feeling of discomfort and stress) are collected by means of a questionnaire and measurements regarding the CSI are evaluated. Altogether, three research questions had to be answered within the scope of the study. The aim of the first research question was to find out whether the CSI changed positively when a BALLance® course was taken.

The results showed that the CSI of the intervention subjects improved significantly ($p=0.0005$) and that the average of the subjects changed positively by 16%. In addition, hypotheses on individual stress and discomfort were established and confirmed. The fact that individual stress perception ($p=0.03$) and complaint perception ($p=0.006$) can be improved by the BALLance® method is shown among other things by the average values. The feeling of stress improved from 7.5 to 5.5 units on a scale of 0-10. The BALLance® method achieved an average improvement of 1.7 in the feeling of heaviness. The study concludes with the additional measurement of body size before and after the intervention. This resulted in an average increase in body height of 1 cm. It is important to mention that the individual parameters are by no means the same as the CSI values, as individual stress management strategies, self-assessment and internal and external factors are different for each test person.

The results in t1 indicate a median of 7, whereas the median after conducting the BALLance Method is 5,75. Therefore the training program lead to reduction of 1,25 in the subjective stress perception.

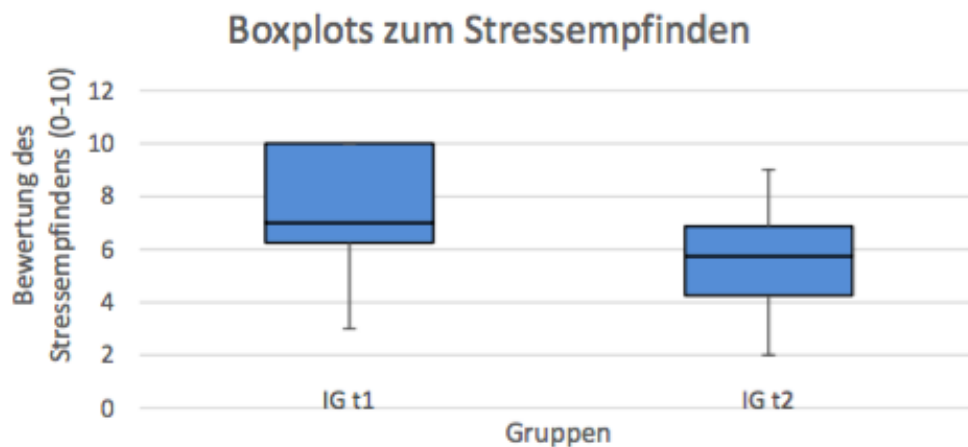


Figure 1: subjective stress perception on Scale 0 to 10.

Before the BALLance Method the Cardio Stress Index indicated values between 26 and 44 % with a median of 35 %. After the BALLance Method the Cardio Stress Index has been significantly reduced to on average 19 %. Concluding that the BALLance Method helps people reducing their stress level.

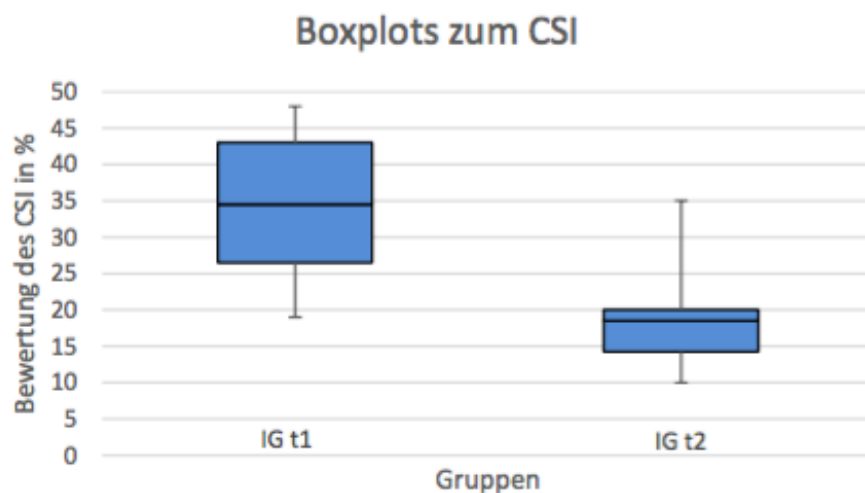


Figure 2: Cardio Stress Index before and after the BALLance Method.