then analysed per block. The final model was made using the enter method (p < 0.05).

The data was analysed using 3 different approaches to define progression: 1) a change of more than 0.5 SD of the mean WOMAC pain score at baseline, 2) a shift to a higher quintile-group, or remaining in the 3 highest quintiles of WOMAC pain scores as proposed by Sharma et al., 3) any deterioration in WOMAC pain score. The first 2 approaches were analysed with logistic regression analyses. The third approach was analysed with linear regression analyses.

Results: Of the 1002 patients in the CHECK cohort, the majority were female (79%). Mean age was 56 years. 82.7% of all patients had knee pain, while 58.7% had hip pain at baseline. Almost half of the patients (41.4%) consulted for hip and knee pain.

On average the pain of the CHECK patients declined slightly over the first two years. However, after two years 40.1% of the patients had a higher WOMAC pain score than at baseline.

For the approach based on change >0.5 SD we found for hip complaints that moderate alcohol use and a higher WOMAC pain score at baseline protected against an increase, while a painful hip flexion led to more pain after two years. While the Sharma method only found a relation between a painful hip flexion and more pain, the linear regression analysis yielded that having paid employment and more pain at baseline (WOMAC) and a better health (SF 36) protected against more pain, while having concomitant complaints of arm, neck and shoulder led to more pain.

For knee complaints the SD method yielded that moderate alcohol use, more pain at baseline and a better vitality (SF 36) protected against an increase in pain, while hip stiffness and a Kellgren & Lawrence (KL) score of or more was related to more pain after two years. Using the Sharma method we found that moderate alcohol use and a better physical functioning score (SF 36) protected against more pain, while hip stiffness and a KL ≥ 2 led to more pain after two years. Finally the linear regression showed that more pain at baseline (WOMAC) and a better physical functioning score (SF 36) protected against an increase in pain.

Conclusions: We were able to identify several predictors on progression of pain in early osteoarthritis. However the predictors for the 3 definitions of deterioration of pain are very different. Not one factor was found in all 3 methods for one joint. This indicates that the choice of what is regarded as deterioration is essential.

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NEUROMUSCULAR FUNCTION OF THE SCAPULAR STABILIZING MUSCLES WITH AND WITHOUT ELECTROMYOGRAPHIC BIOFEEDBACK

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Purpose: Subacromial impingement SI and glenohumeral osteoarthritis (OA) are traditionally treated as separate pathologic conditions but often present concurrently in the same patient and both conditions have been associated with abnormal scapular positioning and muscle coordination. A proposed impairment model could be that a lack of stabilizing activity in the lower trapezius muscle could cause an alignment deviation of the scapula. This could potentially lead to structural and pathomechanical alterations like SI as a first sign of increased deterioration in the joint eventually leading to OA. In the present study the aim was to compare subjects with SI with healthy subjects regarding the neuromuscular function during a standardized selective activation task subsequent to a visual biofeedback guided training session.

Methods: Thirty subjects volunteered, 15 subjects with impingement syndrome (40 yrs ± 13) (imp) and 15 healthy subjects (39 yrs ± 12) (no-imp). Inclusion criteria for imp were at least 30 days with pain/discomfort in the shoulder/neck region within the last year and 2 or more positive impingement tests, while for no-imp it was less than 8 days with pain/discomfort within the last year and no positive impingement tests. Surface EMG was recorded from 4 parts of the trapezius muscle, maximal EMG amplitude (MVE) was measured and muscle activity was calculated as %MVE for each part. With subjects lying prone the EMG signals from the 4 parts of trapezius muscle were used for visual biofeedback source. Training sessions of selective activation tasks of each of the 4 parts of trapezius were conducted. Subsequently, the final task was in 3 attempts of 30 sec to perform the selective activation without visual biofeedback. Successful selective activation was defined as activity in the requested subdivision above 12% while the others were below 1.5% MVE. Secondly, during the attempt of selective activation the activation ratio was calculated as the activity of the requested muscle part relative to the total activation in all 4 muscle parts in 1 sec time bins. For each task the largest 1 sec value was taken as the peak value. An unpaired t-test was applied to test differences between groups.

Results: A significantly lower activation ratio for both the lower and upper parts was found for both imp and no-imp when no visual guiding were provided compared to the biofeedback training trials (table 1). Without biofeedback no subjects were able to selectively activate the upper part but 5 no-imp vs. 0 imp subjects attained selective activation of the lower part. Regarding activation ratio, there was no difference in the mean peak values of imp and no-imp. However, 9 no-imp vs. 3 imp, attained an activation ratio higher than 95% of the lower part while for the upper part none of the subjects reached 95%.

Table 1. Number (% SD) of subjects with (imp) and without Impingement (no-imp) who are able to selectively activate trapezius muscles (upper/lower parts) during sessions with and without visual biofeedback.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>N=30</th>
<th>Selective activation with/without biofeedback</th>
<th>Selective activation with/without biofeedback</th>
<th>Difference between selective activation with/without biofeedback (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imp. group</td>
<td>15</td>
<td>95.5% (6.5)</td>
<td>50.6% (6.2)</td>
<td>(p &lt; 0.05)</td>
</tr>
<tr>
<td>Lower subdivisions</td>
<td>95.6% (6.5)</td>
<td>90.5% (6.2)</td>
<td>(p &lt; 0.05)</td>
<td></td>
</tr>
<tr>
<td>Upper subdivisions</td>
<td>85.7% (14.9)</td>
<td>67.5% (14.9)</td>
<td>(p &lt; 0.001)</td>
<td></td>
</tr>
<tr>
<td>No-imp. group</td>
<td>15</td>
<td>96.4% (2.8)</td>
<td>93.4% (4.4)</td>
<td>(p &lt; 0.05)</td>
</tr>
<tr>
<td>Lower subdivisions</td>
<td>96.4% (2.8)</td>
<td>93.4% (4.4)</td>
<td>(p &lt; 0.05)</td>
<td></td>
</tr>
<tr>
<td>Upper subdivisions</td>
<td>85.3% (13.0)</td>
<td>70.2% (14.3)</td>
<td>(p &lt; 0.001)</td>
<td></td>
</tr>
</tbody>
</table>

Conclusions: The results indicate that the no-imp subjects after a biofeedback training session have a superior scapula muscle control compared to the imp. The observed effect of biofeedback to increase activation ratio of both upper and lower parts in attempted selective activation shows that it is feasible to use biofeedback to improve the neuromuscular function and thereby improve scapular coordination also in individuals with SI.

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HEALTH STATUS AND IMPACT OF PAIN: A COMPARATIVE STUDY BETWEEN FEMALE PATIENTS WITH THE EHLERS-DANLOS SYNDROME, FIBROMYALGIA AND RHEUMATOID ARTHRITIS

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Purpose: The Ehlers-Danlos Syndrome (EDS) is one of the most prevalent heritable connective tissue disorders. Generalized severe joint hypermobility, which is frequently associated with joint dislocations, chronic pain and premature osteoarthritis, is the dominant clinical manifestation of the hypermobility subtype of EDS (EDS-HT). The musculoskeletal pain is early in onset, chronic and debilitating. However, research on the burden of the disease is scarce. The goal of this study was to compare the impact of disease, assessed by measures of pain and health-related quality of life (HRQOL), between patients with EDS-HT, fibromyalgia (FM) and rheumatoid arthritis (RA), diseases which are characterized by chronic widespread musculoskeletal pain.

Methods: A total of 206 female patients were compared: 72 patients with EDS-HT, 69 patients with FM and 65 patients with RA. The psychosocial impact of chronic pain was assessed using the Multidimensional Pain Inventory (MPI), which comprises five subscales: pain severity, pain interference, perceived life control, affective distress and social support. The health-related dysfunction was quantified using the Sickness Impact Profile (SIP), containing twelve different subscales aggregated into a physical, psychosocial and overall health dimension. Scores were compared by non-parametric test (Kruskal-Wallis) and the Bonferroni procedure was used to adjust for multiple testing.

Results: The results of this study showed an important impact of pain on everyday life for all groups (Figure 1). The MPI T-scores revealed that the EDS-HT group has significantly higher levels of pain intensity.