**Table I.** Characteristics of included studies

| Authors | Participants | Intervention | Follow-up | Outcomes | Main results | Risk of bias |
|---|---|---|---|---|---|---|
| *Exercises* | | | | | | |
| Andersen et al. (18) 2012, Dalager et al. (22) 2015, Gram et al. (24) 2014 | Symptomatic and asymptomatic office workers *n* = 573 male: 223 female: 350 mean age (SD), 45.8 years (10.2) | Group 1 (*n* = 116): Supervised progressive resisted exercises (front raise, lateral raise, reverse fly, shrug and wrist extension; progression from 20 RM to 8 RM and adjusted for pain levels; 20 weeks), 1 h/week<br>Group 2 (*n* = 126): Supervised progressive resisted exercises, 3 × 20 min/week<br>Group 3 (*n* = 106): Supervised progressive resisted exercises, 9 × 7 min/week<br>Group 4 (*n* = 124): Minimally supervised progressive resisted exercises, 3 × 20 min/week<br>Group 5 (*n* = 101): Control group | 20 weeks | Right shoulder pain numerical scale in the past 3 months (10 points scale)<br><br>Left shoulder pain numerical scale in the past 3 months (10 points scale)<br>DASH (%)<br><br><br><br><br>Adherence (% of participant who exercised at least 20 min/ week)<br><br><br><br><br>Self-reported compliance<br>Muscle performance test (1 RM and endurance) and total training volume<br>Self-rated health, exercise self-efficacy, workability or productivity | Difference between group 5 and:<br>Group 1: 0.56 (95% CI: 0.42 to 1.05)<br>Group 2: 0.36 (95% CI: −0.12 to 0.84)<br>Group 3: 0.43 (95% CI: −0.07 to 0.93)<br>Intervention groups (group 1, 2, 3 combined): 0.45 (95% CI: 0.04 to 0.85)<br>Difference between group 5 and:<br>Group 1: 0.41 (95% CI: −0.03 to 0.85)<br>Group 2: 0.19 (95% CI: −0.24 to 0.62)<br>Group 3: 0.32 (95% CI: −0.12 to 0.77)<br>Intervention groups (group 1, 2, 3 combined): 0.30 (95% CI: −0.06 to 0.67)<br>Difference between group 5 and:<br>Group 1: 4 (95% CI: 1 to 8)<br>Group 2: 7 (95% CI: 3 to 10)<br>Group 3: 2 (95% CI: −1 to 6)<br>Intervention groups (group 1, 2, 3 combined): 4 (95% CI: 2 to 7)<br>Group 1: 49<br>Group 2: 60<br>Group 3: 60<br>Group 4: 47<br>Statistically significant difference between groups favouring group 2 and 3 over group 1 ($p < 0.05$)<br>No statistically significant differences between group 2 and 4 ($p < 0.14$)<br>No statistically significant differences between groups ($p \geq 0.05$)<br>No statistically significant differences between groups ($p \geq 0.05$)<br><br>No statistically significant differences within and between groups for compliant participants ($p \geq 0.05$) | 11/16 |
| Blangsted et al. (19) 2008 | Symptomatic and asymptomatic office workers *n* = 549 male: 195 female: 354 mean age (SD): 44.9 years (9.3) | Group 1 (*n* = 180): Supervised resisted exercises (shoulder extension, shoulder abduction, shoulder lift, isometric contraction for flexion, extension and side-bending of the neck, rowing or kayaking machine) 3 × 20 min/week<br>Group 2 (*n* = 187): General physical exercises (general aerobic and strengthening exercises, visit by an instructor 1–4 times a month)<br>Group 3 (*n* = 182): Control group (education) | 12 months | Shoulder pain intensity<br><br>Duration of shoulder symptoms<br><br>Work Ability Index (0–42) | Statistically significant difference between groups favouring group 1 combined with group 2 over group 3 ($p = 0.0318$)<br>Statistically significant difference between groups favouring group 1 combined with group 2 over group 3 ($p = 0.0565$)<br>No statistically significant differences between group 1 combined with group 2 over group 3 ($p = 0.3073$)<br>No statistically significant differences between group 1 and 2 ($p = 0.4220$) | 12/16 |
| Horneij et al. (25) 2001 | Symptomatic and asymptomatic healthcare workers *n* = 282 male: 0 female: 282 mean age: 44.0 years | Group 1 (*n* = 90): Exercises (individualized programme including: Posture, balance, muscular endurance, functional exercises, stretching exercises, cardiovascular fitness), 20 min, self-exercise and 4 supervised sessions<br>Group 2 (*n* = 93): Stress management training (psycho-social intervention) 1 × /week for 7 weeks and follow-up at 3 and 6 months<br>Group 3 (*n* = 99): Control group | 18 months | Improvement of shoulder symptoms (%)<br>1. 12 months<br>2. 18 months<br><br><br><br><br>Aggravation of shoulder symptoms (%)<br>1. 12 months<br>2. 18 months | Pre-post difference within groups:<br>1-Group 1: 32 ($p < 0.05$)<br>Group 2: 33 ($p \geq 0.05$)<br>Group 3: 37 ($p \geq 0.05$)<br>No statistically significant differences between groups ($p \geq 0.05$)<br>2-Group 1: 27 ($p \geq 0.05$)<br>Group 2: 30 ($p \geq 0.05$)<br>Group 3: 30 ($p \geq 0.05$)<br>No statistically significant differences between groups ($p \geq 0.05$)<br>Pre-post difference within groups:<br>1-Group 1: 12 ($p \geq 0.05$)<br>Group 2: 16 ($p \geq 0.05$)<br>Group 3: 20 ($p \geq 0.05$)<br>No statistically significant differences between groups ($p \geq 0.05$)<br>2-Group 1: 17 ($p \geq 0.05$)<br>Group 2: 16 ($p \geq 0.05$)<br>Group 3: 18 ($p \geq 0.05$)<br>No statistically significant differences between groups ($p \geq 0.05$) | 7/16 |

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| Jay et al. (26) 2015 | Symptomatic laboratory technicians<br>$n = 112$<br>gender: not mentioned<br>mean age (SD): 46.6 years (8.6) | Group 1 ($n = 56$): Exercises (elastic resistance band exercises targeting the shoulder girdle and arm/hand, control motor exercises with education on pain de-catastrophizing and fear-avoidance beliefs) 4 ×/week and mindfulness session 1 ×/week<br>Group 2 ($n = 56$): Control (Email with encouragement to participate in the company's on-going health initiatives) | 10 weeks | Shoulder pain intensity (11 points scale) | Pre-post difference within groups:<br>Group 1: 2.2 (95% CI: 1.6 to 2.9)<br>Group 2: 0.6 (95% CI: 0.1 to 1.2)<br>Difference between groups: 1.6 (95% CI: 0.9 to 2.3) $p = 0.0007$ | 12/16 |
| Jorgensen et al. (27) 2011 | Symptomatic and asymptomatic cleaning workers<br>$n = 294$<br>male: 0<br>female: 294<br>mean age (SD): 45.0 years (9.2) | Group 1 ($n = 95$): Exercises (stabilization exercises of the trunk muscles and shoulder girdle: abdominal bracing, bridge, four point kneeling, horizontal side support, vertical plank, body blade), 1 h/week for 3 months to 1 h/month in the last 6 months<br>Group 2 ($n = 99$): Education (cognitive behavioural training on coping in groups), 2 h/2 weeks for 3 months, 2 h/month for 3 months, 1 h/month in for 6 months<br>Group 3 ($n = 100$): Control (1 h health check) | 12 months | Prevalence of right shoulder pain for >30 days in the past year (%) | Pre-post differences within groups:<br>Group 1: 6 ($p \geq 0.05$)<br>Group 2: 4 ($p \geq 0.05$)<br>Group 3: 0 ($p \geq 0.05$)<br>No statistically significant differences between groups ($p \geq 0.05$) | 11/16 |
| | | | | Prevalence of left shoulder pain for >30 days in the past year (%) | Pre-post differences within groups:<br>Group 1: 4 ($p \geq 0.05$)<br>Group 2: 1 ($p \geq 0.05$)<br>Group 3: −1 ($p \geq 0.05$)<br>No statistically significant differences between groups ($p \geq 0.05$) | |
| | | | | Work ability (11 points scale) (SD) | Pre and post treatment:<br>Group 1: 7.6 (2.0); 7.8 (1.9) ($p \geq 0.05$)<br>Group 2: 7.5 (2.1); 7.5 (2.1) ($p \geq 0.05$)<br>Group 3: 7.3 (2.2); 7.4 (2.4) ($p \geq 0.05$)<br>No statistically significant differences between groups ($p \geq 0.05$) | |
| | | | | Sickness absence (days) | No statistically significant differences between groups ($p \geq 0.05$) | |
| Lundblad et al. (30) 1999 | Symptomatic female industrial workers<br>$n = 58$<br>male: 0<br>female: 58<br>mean age (SD): 33 years (9) | Group 1 ($n = 15$): Exercises (stabilization, strength, coordination, endurance, flexibility and rhythm exercises) and education on coping skills<br>Group 2 ($n = 20$): Feldenkrais exercises (body awareness, coordination and control) and intervention (education, coping skills)<br>Group 3 ($n = 23$): Control group | 16 weeks | Mean pain during a shoulder endurance flexion test (10-cm VAS) (SD) | Pre and post treatment:<br>Group 1: 2.15 (3.29); 1.14 (1.43) ($p \geq 0.05$)<br>Group 2: 2.29 (3.89); 1.74 (2.32) ($p \geq 0.05$)<br>Group 3: 2.23 (3.25); 1.37 (1.86) ($p \geq 0.05$)<br>No significant differences between groups ($p \geq 0.05$) | 6/16 |
| | | | | Prevalence of shoulder pain in the last 7 days (%) | Pre-post differences within groups:<br>Group 1: 0 ($p \geq 0.05$)<br>Group 2: 40 ($p < 0.05$)<br>Group 3: 0 ($p \geq 0.05$)<br>No significant differences between groups ($p \geq 0.05$) | |
| | | | | Shoulder-index complaint indices (8 point scale) (SD) | Pre- and post-treatment:<br>Group 1: 3.1 (1.9); 2.5 (2.0) ($p \geq 0.05$)<br>Group 2: 3.3 (1.9); 2.5 (2.0) ($p \geq 0.05$)<br>Group 3: 2.4 (2.3); 2.5 (2.2) ($p \geq 0.05$)<br>No significant differences between groups ($p \geq 0.05$) | |
| | | | | Work disability (2 points scale) (SD) | Pre- and post-treatment:<br>Group 1: 1.3 (1.0); 1.3 (1.1) ($p \geq 0.05$)<br>Group 2: 1.2 (0.9); 1.0 (1.0) ($p \geq 0.05$)<br>Group 3: 1.3 (1.1); 1.2 (1.0) ($p \geq 0.05$)<br>No significant differences between groups ($p \geq 0.05$) | |
| | | | | Sick leave (%) (SD) | Pre- and post-treatment:<br>Group 1: 6.5 (7.7); 7.6 (12.5) ($p \geq 0.05$)<br>Group 2: 5.8 (6.8); 5.7 (5.9) ($p \geq 0.05$)<br>Group 3: 5.9 (7.4); 7.6 (8.1) ($p \geq 0.05$)<br>No significant differences between groups ($p \geq 0.05$) | |
| Moreira et al. (32) 2015 | Symptomatic and asymptomatic workers from a manufacturing company<br>$n = 70$<br>gender: not mentioned<br>mean age (SD): 38.35 years (7.65) | Group 1 ($n = 39$): Supervised exercises (stretching exercises of the upper limb, general strength exercises of the lower limb), 10–15 min/session, 3 × /week and stretching and strengthening programme at home<br>Group 2 ($n = 31$): Control group | 6 months | Shoulder pain intensity Median (interquartile range) (11 points scale) | Pre- and post-treatment:<br>Group 1: 4 (7); 4 (5), ($p = 0.269$)<br>Group 2: 3 (6); 3 (6), ($p = 0.827$) | 9/16 |
| | | | | Prevalence of shoulder pain in the last 7 days (%) | Pre-post difference within groups:<br>Group 1: −2.6 ($p = 1$)<br>Group 2: −9.7 ($p = 0.508$)<br>Difference between group 1 and 2: 7.1 ($p$-value not reported) | |
| | | | | Prevalence of daily activities limitation in the shoulder region in the last 12 months (%) | Pre-post difference within groups:<br>Group 1: −2.6 ($p = 1$)<br>Group 2: 3.3 ($p = 1$)<br>Difference between group 1 and 2: 5.9 ($p$-value not reported) | |

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| Pereira et al. (33) 2013 | Symptomatic and asymptomatic garment workers<br>*n* = 61<br>male: 18 female: 43<br>mean age (SD): 28.4 years (8.41) | Group 1 (*n* = 44): Supervised exercises (stretching, muscular endurance, massage) 10 min, 2 × /day, 5 × /week<br>Group 2 (*n* = 17): Control group | 12 weeks | Shoulder pain intensity (11 points scale) (SD)<br><br><br>Prevalence of shoulder pain (%) | Pre- and post-treatment:<br>Group 1: 7.1 (2.2); 4.9 (1.8) ($p = 0.038$)<br>Group 2: 5.0 (0.0); 5.8 (1.1) ($p = 0.923$)<br>Difference between group 1 and 2: (*p*-value not reported)<br>Pre-post difference within groups:<br>Group 1: 10 ($p = 0.943$)<br>Group 2: 15.6 ($p = 0.981$)<br>Difference between group 1 and 2: 5.6 (*p*-value not reported) | 7/16 |
| Rasotto et al. (36) 2014 | Symptomatic metal workers<br>*n* = 68<br>male: 68<br>female: 0<br>mean age (SD): 41.10 years (7.69) | Group 1 (*n* = 34): Supervised exercises (stretching and strengthening: low-weight and elastic band shoulder abduction/adduction, shoulder flexion/extension, forward and lateral pushes), 3 × 5 repetitions, 2 × /week for 9 months<br>Group 2 (*n* = 34): Control group | 10 months | Shoulder pain (cm VAS) (SD)<br>1. 5 months<br>2. 10 months<br><br><br><br><br>Shoulder elevation (°) (SD)<br>1. 5 months<br>2. 10 months<br><br><br><br><br>Shoulder abduction (°) (SD)<br>1. 5 months<br>2. 10 months | Pre-post difference within groups:<br>1.Group 1: 0.43 (1.26) ($p < 0.05$)<br>Group 2: −0.05 (1.70) ($p \geq 0.05$)<br>Difference between group 1 and 2: ($p = 0.1037$)<br>2.Group 1: 0.94 (1.09) ($p < 0.05$)<br>Group 2: −0.17 (2.02) ($p \geq 0.05$)<br>Difference between group 1 and 2: ($p = 0.0224$)<br>Pre-post difference within groups:<br>1.Group 1: 5.92 (5.59) ($p < 0.05$)<br>Group 2: −1.73 (4.59) ($p \geq 0.05$)<br>Difference between group 1 and 2: ($p = 0.0005$)<br>2.Group 1: 7.03 (8.39) ($p < 0.05$)<br>Group 2: −0.99 (5.66) ($p \geq 0.05$)<br>Difference between group 1 and 2: ($p = 0.0007$)<br>Pre-post difference within groups:<br>1.Group 1: 16.56 (17.25) ($p < 0.05$)<br>Group 2: 5.75 (18.78) ($p \geq 0.05$)<br>Difference between group 1 and 2: ($p = 0.0106$)<br>2.Group 1: 15.07 (13.58) ($p < 0.05$)<br>Group 2: −1.73 (4.59) ($p \geq 0.05$)<br>Difference between group 1 and 2: ($p = 0.0125$) | 8/16 |
| Rasotto et al. (35) 2015 | Symptomatic workers from a manufacturing company<br>*n* = 60<br>male: 0<br>female: 60<br>mean age (SD): 39.21 years (6.18) | Group 1 (*n* = 30): Supervised individualized exercises (stretching and low-weight strengthening exercises or active mobilization in presence of pain) 3 × 5 repetitions, 2 × /week for 6 months<br>Group 2 (*n* = 30): Control group | 6 months | Shoulder pain (10 cm VAS) (SD)<br><br><br><br>Shoulder elevation (°) (SD)<br><br><br><br>Shoulder abduction (°) (SD) | Pre- and post-treatment:<br>Group 1: 2.39 (2.58); 1.79 (2.15) ($p < 0.05$)<br>Group 2: 2.03 (2.20); 2.85 (2.41) ($p \geq 0.05$)<br>Difference between group 1 and 2: ($p = 0.039$)<br>Pre- and post-treatment:<br>Group 1: 164.91 (7.25); 170.12 (10.12) ($p < 0.05$)<br>Group 2: 167.60 (11.48); 167.05 (16.48) ($p \geq 0.05$)<br>Difference between group 1 and 2: ($p = 0.035$)<br>Pre- and post-treatment:<br>Group 1: 162.99 (13.42); 170.05 (10.12) ($p < 0.05$)<br>Group 2: 161.46 (16.83); 160.20 (26.15) ($p \geq 0.05$)<br>Difference between group 1 and 2: ($p = 0.003$) | 9/16 |
| Tsauo et al. (37) 2004 | Symptomatic and asymptomatic office workers from an airline company<br>*n* = 178<br>male: 78<br>female: 100<br>mean age (SD): 40.5 years (5.2) | Group 1 (*n* = 56): Self-exercise (stretching exercises for the neck region and cervical range of motion exercise, 10 × 5 s) during office breaks and 2 h lecture (education on neck and shoulder anatomy and about the exercise programme)<br>Group 2: Group exercise 1 (*n* = 69): (1 × /day, all sessions supervised by a PT for 2 weeks and continued by themselves after for 2–3 months) and 2 h lecture<br>Group 3: Group exercise 2 (*n* = 14): (2 × /day, half of the sessions supervised by a PT for 2 weeks and continued by themselves after for 2–3 months) and 2 h lecture<br>Group 4 (*n* = 39): Control group (2 h lecture) | 3 months | Reported soreness in past week in the shoulder region (%) | Pre-post difference within groups :<br>Group 1: 23.1 ($p < 0.05$)<br>Group 2: 0.6 ($p \geq 0.05$)<br>Group 3: 6.0 ($p \geq 0.05$)<br>Group 4: −13.2 ($p \geq 0.05$)<br>Difference between group 1 and 4: 36.2 (*p*-value not reported)<br>Difference between group 2 and 4: 13.8 (*p*-value not reported)<br>Difference between group 3 and 4: 19.2 ($p < 0.05$) | 7/16 |

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| Zebis et al. (40) 2011 | Symptomatic and asymptomatic laboratory technicians<br>*n* = 537 male: 82 female: 455 mean age (SD): 42.0 years (10.5) | Group 1 (*n* = 282): Supervised resisted exercises (front raise, lateral raise, reverse fly, shrug, wrist extension) progression from 15 RM to 8–12 RM, 20 min/session, 3 ×/week<br>Group 2 (*n* = 255): Control group (advice to stay physically active, consulted 1 ×/week) | 20 weeks | Shoulder pain intensity in the last 7 days for symptomatic participants (10 points scale) (SD)<br>Odds ratio for improvement of shoulder pain<br>Odds ratio for prevention of developing shoulder pain | Pre- and post-treatment:<br>Group 1: 4.8 (1.7); 1.4 (1.7) (*p*-value not reported)<br>Group 2: 4.7 (1.8); 2.5 (2.6) (*p*-value not reported)<br>3.9 (95% CI: 1.7 to 9.4)<br>0.6 (95% CI: 0.3 to 1.3) | 11/16 |
| *Ergonomic intervention* | | | | | | |
| Aghilinejad et al. (17) 2015 | Symptomatic and asymptomatic automobile factory workers<br>*n* = 223<br>gender: not mentioned<br>mean age: 30.4 years | Group 1 (*n* = 79): Ergonomic intervention (5 h workshop about neck and shoulder complaints and related ergonomic concepts)<br>Group 2 (*n* = 70): Ergonomic education (5 h lecture with the same concepts)<br>Group 3 (*n* = 74): Ergonomic education (pamphlet with the same concepts)<br>Group 4 (*n* = 251): Control group | 1 year | Prevalence of shoulder pain in the last week (%)<br>Prevalence of shoulder pain in the last year (%) | Pre-post difference within groups:<br>Group 1: 10 (*p* = 0.002)<br>Group 2: 5 (*p* = 0.063)<br>Group 3: 4 (*p* = 0.054)<br>Group 4: not reported<br>Difference between groups: *p*-value not reported<br>Pre-post difference within groups:<br>Group 1: 5 (*p* = 0.020)<br>Group 2: 7 (*p* = 0.066)<br>Group 3: 5 (*p* = 0.115)<br>Group 4: not reported<br>Difference between groups: *p*-value not reported | 8/16 |
| Cook & Burgess-Limerick (21) 2004 | Symptomatic and asymptomatic workers from newspaper call centre<br>*n* = 59<br>male: 5 female: 54<br>mean age (range): 39 years (21–68) | Group 1 (*n* = 30): Ergonomic intervention (maintaining forearm position with monitoring for the first h and weekly)<br>Group 2 (*n* = 29): Control group (ergonomic intervention according to Australian standards) | 12 weeks | Prevalence of shoulder discomfort (%)<br>1. 6 weeks<br>2. 12 weeks | 1. Pre-post difference within groups:<br>Group 1: −1 (*p*-value not reported)<br>Group 2: −6 (*p*-value not reported)<br>Difference between groups: 5 (*p* = 0.36)<br>2. Pre-post difference within groups:<br>Group 1: 0 (*p*-value not reported)<br>Group 2: 10 (*p*-value not reported)<br>Difference between groups: −10 (*p* = 0.15) | 9/16 |
| Galinsky et al. (23) 2000 | Symptomatic and asymptomatic data-entry operators<br>*n* = 42<br>male: 11 female: 31<br>mean age: 30 years | Group 1 (*n* = 23): Supplementary work break (5 min every h and a 15 min, 2 ×/shift)<br>Group 2 (*n* = 19): Control group (Regular work break, 15 min, 2 ×/shift) | 16 weeks | Discomfort (5 points scale) | Significant differences between groups for post intervention score for left and right shoulders favouring group 1 (*p* < 0.01) | 6/16 |
| Ketola et al. (28) 2002 | Symptomatic office workers using a video display unit<br>*n* = 109<br>male: 46 female: 63<br>mean age: 47.9 years | Group 1 (*n* = 39): Ergonomic intervention (checklist on workstation organization and workstation adjustments suggested by a physiotherapist)<br>Group 2 (*n* = 35): Ergonomic education (1-h training session)<br>Group 3 (*n* = 35): Control group (one page pamphlet on musculoskeletal health) | 10 months | Musculoskeletal discomfort (5 points scale) (SD)<br>Right shoulder<br>1. 2 months<br>2. 10 months<br><br><br><br><br><br><br><br><br>Musculoskeletal discomfort (5 points scale) (SD)<br>Left shoulder<br>1. 2 months<br>2. 10 months | Post treatment adjusted for baseline:<br>1. Group 1: 2.2 (0.2) (*p*-value not reported)<br>Group 2: 2.4 (0.1) (*p*-value not reported)<br>Group 3: 2.8 (0.2) (*p*-value not reported)<br>Statistically significant differences favoring group 1 over group 3 (*p* = 0.022)<br>No statistically significant differences between group 2 and 3 (*p* = 0.12)<br>2. Group 1: 2.6 (0.2) (*p*-value not reported)<br>Group 2: 2.5 (0.2) (*p*-value not reported)<br>Group 3: 2.7 (0.2) (*p*-value not reported)<br>No statistically significant differences between group 1 and 3 (*p* = 0.53) and between 2 and 3 (*p* = 0.36)<br>Post treatment adjusted for baseline:<br>1.Group 1: 1.9 (0.1) (*p*-value not reported)<br>Group 2: 2.1 (0.1) (*p*-value not reported)<br>Group 3: 2.4 (0.2) (*p*-value not reported)<br>Statistically significant differences favoring group 1 over group 3 (*p* = 0.025)<br>No statistically significant differences between group 2 and 3 (*p* = 0.15)<br>2. Group 1: 2.2 (0.2) (*p*-value not reported)<br>Group 2: 2.4 (0.2) (*p*-value not reported)<br>Group 3: 2.3 (0.2) (*p*-value not reported)<br>No statistically significant differences between group 1 and 3 (*p* = 0.61) and between 2 and 3 (*p* = 0.86) | 9/16 |

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| King et al. (29) 2013 | Symptomatic and asymptomatic office workers $n=23$ gender: not mentioned mean age: not mentioned | Group 1 ($n=11$): Use of a biofeedback mouse (Hoverstop, Ontario, Canada)<br>Group 2 ($n=12$): Control group | 25 weeks | Intensity of shoulder pain (11 points scale) (SD)<br>1. 5 weeks<br>2. 25 weeks | Pre- and post-treatment:<br>1.Group 1: 2.09 (2.18); 0.76 (1.14)<br>Group 2: 1.36 (2.26); 1.11 (1.70)<br>Difference between groups in post treatment score: ($p \geq 0.05$)<br>2.Group 1: 2.09 ± 2.18; 0.79 ± 1.22<br>Group 2: 1.36 ± 2.26; 1.58 ± 2.87<br>Difference between groups in post treatment score: ($p < 0.05$) | 10/16 |
| Veiersted et al. (38) 2008 | Symptomatic and asymptomatic hairdressers $n=38$ male: 0 female: 38 mean age (SD): 29.53 years (5.53) | Group 1 ($n=20$): Ergonomic intervention (oral and written recommendations by an occupational therapist and individualized follow-up)<br>Group 2 ($n=18$): Control group (oral and written recommendations) | 1 to 2 months | Prevalence of shoulder complaint (%) | Pre-post differences within groups:<br>Group 1: 10 ($p \geq 0.05$)<br>Group 2: 4 ($p \geq 0.05$)<br>Difference between groups: 6 ($p$-value not reported by the authors) | 8/16 |
| Pillastrini et al. (34) 2007 | Symptomatic and asymptomatic administrative personnel using a VDT $n=200$ male: 58 female: 142 mean age (SD): 44.3 years (7.6) | Group 1 ($n=100$): Ergonomic intervention (adjustments and alterations to the existing furniture by a physical therapist) and informative brochure<br>Group 2 ($n=100$): Control group (informative brochure) | 6 months | Prevalence of shoulder pain (%)<br><br><br><br>Reduction in shoulder pain (Symptoms at baseline to no symptoms at follow-up %)<br>Development of shoulder pain (Symptoms at baseline to no symptoms at follow-up %) | Pre-post differences within groups:<br>Group 1: 12 ($p=0.02$)<br>Group 2: 2 ($p \geq 0.05$)<br>Difference between groups: 10 ($p$-value not reported)<br>Pre-post differences within groups:<br>Group 1: 15.2<br>Group 2: 4.1<br>Difference between groups: 11.1 ($p$-value not reported)<br>O.R. (95% CI): 2.9 (0.3–27.4) $p=0.352$<br>Pre-post differences within groups:<br>Group 1: 2.1<br>Group 2: 3.0<br>Difference between groups: 0.9 ($p$-value not reported) | 10/16 |
| Yu et al. (39) 2013 | Symptomatic and asymptomatic factory workers $n=1,825$ male: 1,057 female: 768 mean age (SD): 29.0 years (7.3) | Group 1 ($n=848$): Participatory interactive ergonomic intervention (education, workstation inspection, group discussions and action plan for improvement, 5 h)<br>Group 2 ($n=854$): Didactic ergonomic intervention (education, 2 h) | 1 year | Prevalence of shoulder pain (%) | Pre-post difference within groups:<br>Group 1: 3.6 ($p=0.111$)<br>Group 2: 2.0 ($p=0.321$)<br>Difference between groups: 1.6 ($p$-value not reported) | 8/16 |
| *Other interventions* | | | | | | |
| Cheng & Huang (20) 2007 | Symptomatic workers with rotator cuff disorder (type of work not mentioned) $n=94$ male: 72 female: 22 mean age (SD): 32.3 years (10.2) | Group 1 ($n=46$): Workplace-based exercises (shoulder stretching 10 × 15 s, scapular control and rotator cuff strengthening 3 × 10 reps) and biomechanics and ergonomic education, task modification 3 ×/week<br>Group 2 ($n=48$): Clinic-based exercises (upper limb mobilisation activity, strength and endurance exercises) + work simulation, 3 ×/week | 4 weeks | SPADI score<br><br>Proportion of participants returned to work (%)<br><br>Shoulder strength and range of motion | Pre- and post-treatment:<br>Group 1: 54.25 ± 12.07; 40.50 ± 16.30<br>Group 2: 52.09 ± 10.89; 31.54 ± 13.37<br>Difference between groups: ($p=0.034$)<br>Pre-post differences within groups:<br>Group 1: 37.5 ($p$-value not reported)<br>Group 2: 71.7 ($p$-value not reported)<br>Difference between groups: ($p=0.001$)<br>Statistically significant differences between groups ($p<0.05$) for shoulder range of motion in flexion, strength in bilateral carrying, arm lift and high near lift. No statistically significant differences between groups for other variables ($p \geq 0.05$) | 7/16 |
| Mehrparvar et al. (31) 2014 | Symptomatic and asymptomatic office workers $n=164$ male: 80 female: 84 mean age (SD): 38.68 years (7.74) | Group 1 ($n=83$): Ergonomic intervention (evaluation by occupational medicine specialists, modifications of workstation and equipment according to ergonomic rules)<br>Group 2 ($n=81$): Exercises (supervised work-place exercise programme including stretching exercises focusing on neck, shoulder, wrist, back and low back) 2 ×/day | 1 month | Reduction in complaints in shoulder pain (%) | Group 1: ≈20 ($p<0.05$)<br>Group 2: ≈30 ($p<0.05$)<br>Differences between groups: ($p=0.243$) | 9/16 |

DASH: Disability in Arms, Shoulders and Hands, Self-reported disability questionnaire. Higher scores indicate a greater level of disability; RM: repetition maximum; CI: confidence interval; Pre-post: pre-intervention to post-intervention; Work Ability Index: perceived work ability, the higher the score, the better the work ability; NMQ: Nordic Musculoskeletal Questionnaire; VDT: video display terminal; SPADI: Shoulder Pain and Disability Index; SD; standard deviation.