

Table III. Summary of data extracted from included studies

Study (Authors, years, design, country)	Participants (sample size, population, sex, age)	Diagnostic criteria	Prevalence/incidence	Reported as significant risk factor(s)	Reported statistics
Applegate et al. (34) 2017 Cross-sectional Utah	n=1,226 Working population include food processing, manufacturing, assembly lines and office jobs Male=421; Female=805 Mean age, years=42.1±11.4	Physical examination Pain over the glenohumeral areas in the past 1-month period Positive Empty can test	n=156 (12.7% prevalence)	Age Hypertension Systolic blood pressure Job dissatisfaction Cardiovascular disease risk scores 18+	OR=1.03, 95% CI=1.02-1.05 OR=1.94, 95% CI=1.28-2.83 OR=1.01, 95% CI=1.00-1.02 OR=3.11, 95% CI=1.52-6.37 OR=4.49, 95% CI=1.66-12.2
Bansal et al. (35) 2017 Cross-sectional India	n=161 Elite swimmers All male Age range, years=17-35	Physical examination History of exercise-related shoulder pain Positive Neer's or Hawkins' impingement test Presence of >1 of: painful arc, tenderness at greater tuberosity, painful active contraction of any rotator cuff muscle	n=28 (17.4% prevalence)	Atraumatic anterior instability Past history of shoulder pain Inadequate treatment	χ ² tests: χ ² =30.5, p<0.001 χ ² =24.9, p<0.001 χ ² =112.0, p<0.001
Bodin et al. (36) 2012 Prospective France	n=1,456 Working population Male=839; Female=617 Mean age, years=38.9±10.3	Physical examination Intermittent pain, worsened by active movement, ≥4 days during the week ≥1 positive tests of resisted shoulder abduction, external or internal rotation; resisted elbow flexion; painful arc	n=96 (6.6% prevalence) Male: n=51 (6.1% prevalence) Female: n=45 (7.3% prevalence)	Age High perceived physical exertion and repeated and sustained posture with arms above shoulder level (≥2h/day) Low co-worker support Work with temporary workers Repeated and sustained arm abduction	Male aged 45-49: OR=4.7, 95% CI=2.2-10.0; Female aged 50-59, OR=5.4, 95% CI 2.3-13.2 Male: OR=3.3, 95% CI 1.3-8.4 Male: OR=2.0, 95% CI 1.1-3.9 Female: OR=2.2, 95% CI 1.2-4.2 Female: OR=2.6, 95% CI 1.4-5.0
Bugajska et al. (37) 2013 Cross-sectional Poland	n=725 Working population Male=167; Female=558 Mean age, years=42.8±9.9 Age range, years=20-70	Physical examination Intermittent pain worsened by active elevation, ≥4 days during the week ≥1 positive tests of resisted shoulder abduction, external or internal rotation; resisted elbow flexion; painful arc	15.4% prevalence Male: 6% prevalence Female: 18.6% prevalence	Sex: Female	OR=0.33, 95% CI= 0.14-0.78
Frost et al. (38) 1999 Cross-sectional Denmark	n=73 Working population Male=33; Female=40 Mean age, years=47.4±9.1	Physical examination & magnetic resonance imaging Shoulder pain for ≥3 months within the past year Positive Hawkins' test	Not reported	Age ≥50 years	OR=3.79, 95% CI 1.38-10.43
Frost et al. (39) 2002 Cross-sectional Denmark	n=2,743 Working population Sex not reported Age not reported	Physical examination Shoulder pain and a activity impairment scales at least 12/36 scores Pain at resisted abduction and/or palpation tenderness of greater humeral tubercle Positive Hawkins' test	n=48 (2.4% prevalence)	Repetitive work High frequency of movement (15-36 movements/min) High force (≥10% of MVC) requirements ≥80% of cycle time without pauses High frequency and high force exposure High frequency and no pauses >80% of cycle time High force and no pauses >80% of cycle time	OR _{adj} = 3.12, 95% CI 1.33-7.34. OR _{adj} = 3.29, 95% CI 1.34-8.11 OR _{adj} = 4.21, 95% CI 1.71-10.40 OR _{adj} = 3.33, 95% CI 1.37-8.13 OR _{adj} = 4.82, 95% CI= 1.86-12.51 OR _{adj} = 3.53, 95%CI= 1.43-8.70 OR _{adj} = 4.48, 95% CI 1.73-11.61
Grzywacz et al. (40) 2012 Cross-sectional USA	n=742 Latino poultry manual workers Male=423; Female=319 Age range, years=18 to ≥50	Physical examination Tenderness to palpation Pain with resisted abduction, internal rotation, external rotation or forward flexion of shoulder	n=167 (32.4% prevalence)	Job control Psychological demand Awkward posture & repeated movements Poor safety commitment	OR=0.79, 95% CI 0.65-0.97 OR=1.30, 95% CI 1.07-1.59 OR=1.34, 95% CI 1.07-1.68 OR=1.66, 95% CI 1.16-2.38
Miranda et al. (41) 2005 Retrospective cohort Finland	n=3,885 Working population Male=1,993; Female=1,916 Age range, years=30-64	Physical examination History of pain for at least 3 months ≥1 positive tests of resisted abduction, external rotation and internal rotation, or painful arc of shoulder	n=78 (2.0% prevalence)	Age 50-64 years Insulin-dependent diabetes mellitus 14-23 years of working with a hand above shoulder level	OR=4.1, 95% CI 1.9-9.1 OR 8.8, 95% CI 1.9-40.3 OR=4.7, 95% CI 2.4-9.1
Northover et al. (42) 2007 Case-control UK	n=300 General population Male=135; Female=165 Mean age, years=59.0 (range 24-86)	Physical examination & ultrasound imaging Positive Neer's and Hawkins' sign with relief of symptoms with a subacromial injection of 10 mL 1% Lignocaine	Not reported	Overhead work Heavy manual work Diabetes Hammering Osteoarthritis Weight training Swimming	OR 3.83, 95% CI 2.15-6.84 OR 3.81, 95% CI 1.93-7.51 OR 3.34, 95% CI 1.26-8.85 OR 2.47, 95% CI 1.12-5.44 OR 2.39, 95% CI 1.41-4.07 OR 2.32, 95% CI 1.07-5.05 OR 1.98, 95% CI 1.11-3.53
Rechardt et al. (43) 2010 Cross-sectional Finland	n=6,237 General population Male=2,850; Female=3,387 Mean age, years, for males=50.8, for females=52.9	Physical examination History of pain in rotator cuff region for at least 3 months Pain in one or more active resisted movements (abduction, external rotation, internal rotation) and/or painful arc	Male=1.2% Female=1.2%	Male waist circumference 94-101.9 cm Male Type I diabetes	OR=2.0, 95% CI 1.1-3.5 OR=4.7, 95% CI 1.1-20.3

Table III. Cont

Study (Authors, years, design, country)	Participants (sample size, population, sex, age)	Diagnostic criteria	Prevalence/incidence	Factor(s)	Reported statistics
Roquelaure et al. (44) 2011 Cross-sectional France	n=3,710 Male=2,161; Female=1,549 Mean age, years=38.7±10.3	Physical examination: Intermittent pain in shoulder region, worsened by active elevation movement, currently or 7 days Shoulder abduction, external or internal rotation resisted elbow	Male: 6.6% prevalence Female: 8.5% prevalence	Age Diabetes mellitus Sustained or repeated arm High psychological demand Low decision authority	Male: OR 1.07, 95% CI 1.05-1.09; Female: OR 1.08, 95% CI 1.06-1.10 Female: OR 2.9, 95% CI 1.0-8.6 Male: OR 1.6, 95% CI 1.0-2.4; Female: OR 1.7, 95% CI 1.1-2.5 Male: OR 2.0, 95% CI 1.3-3.1 >90° in male: OR 2.3, 95% CI 1.3-3.9, p=0.002; >60° in female: OR 3.6, 95% CI 1.8-7.3, p<0.001 Male: OR 1.7, 95% CI 1.2-2.5 Female: OR 6.68, 95% CI 1.81-24.66 Female: OR 2.40, 95% CI 1.05-5.51
Silverstein et al. (45) 2009 Cross-sectional USA	n=733 Healthcare and Male=383; Female=350 Mean age, years: Male=41.7±10.0 Female=37.4±11.4	Physical examination: Shoulder pain in the last seven days; occurring more than 3 times or lasting more than 1 Positive tests of resisted shoulder abduction, external rotation, internal rotation or painful arc	Male: n=30 (7.8% prevalence) Female: n=25 (7.1% prevalence)	Physical load: Frequency of forceful exertions Duty cycle of forceful exertions Pinch grip force Lifting force pinch grip force Vibration and pinch grip force	Female: OR 3.35, 95% CI 1.19-9.42 Female: OR 3.16, 95% CI 1.06-9.44; Male: OR 3.16, 95% CI 1.09-9.17 Female: OR 3.04, 95% CI 1.32-7.01 Female: OR 3.76, 95% 1.46-9.68 Female: OR 3.12, 95% CI 1.27-7.68 Female: OR 6.16, 95% CI 1.76-21.57 Female: OR 7.06, 95% CI 1.94-25.66 Female: OR 2.83, 95% CI 1.16-6.88
Silverstein et al. (46) 2008 Cross-sectional USA	Cases: n=733 Healthcare and Male=383; Female=350 Mean age, years=39.5±11.0	Physical examination: Shoulder pain in the last seven days; occurring more than 3 times or lasting more than 1 Positive tests of resisted shoulder abduction, external rotation, internal rotation or painful arc	n=75 (7.5% prevalence)	Physical load: Frequency of forceful exertions Duty cycle of forceful exertions pinch grip force pinch grip force force exertion Low job control/ decision authority	OR 2.02, 95% CI 1.01-4.07 OR 3.27, 95% CI 1.52-7.02 OR 2.16, 95% CI 1.22-3.83 OR 2.59, 95% CI 1.12-6.01 OR 2.75, 95% CI 1.32-5.73 OR 2.21, 95% 1.09-4.49 OR 2.41, 95% CI 1.18-4.94 OR 1.99, 95% CI 1.09-3.61
Stenlund et al. (47) 1993 Cross-sectional Sweden	n=207 Construction industry Sex not reported Mean age, years: Foremen=45.8±10.2	Physical examination: Pronounced palpable pain of the muscle attachment or pronounced pain reaction to isometric contraction in any of the four rotator cuff muscles	n=18 (32.7% prevalence; Right: n=22 (40.0% prevalence) Left: n=6 (11.1% prevalence); Right: n=8 (14.8% prevalence) Foremen: Left: n=8 (8.2% prevalence); Right: n=17 (17.1% prevalence)	Vibration	Left side: OR 1.84, 95% CI 1.10-3.07; Right: OR 1.66, 95% CI 1.06-2.61
Sutinen et al. (48) 2006 Cross-sectional Finland	n=52 All male Age not reported	Physical examination: History of painful arch and intermittent pain Tenderness to palpation in the shoulder region Shoulder abduction or external rotation; painful arc	Right: 19% prevalence Left: 14% prevalence		OR 1.04, 95% CI 1.00-1.07
Svensden et al. (49) 2004 Cross-sectional	n=1,886 Machinists (n=529), Car mechanics (n=599), house painters (n=758) All male Mean age, years: Machinists: 46.3±9.8 Car mechanics: 45.0±8.4 House painters: 48.4±9.2	Physical examination: Shoulder abduction, Jobe's test, painful arc test, abduction internal rotation test	Machinists: 2% prevalence Car mechanics: 1.4% prevalence House painters: 4.4% prevalence	Age: 60-70 Upper arm elevation >90° for High job demand	OR 3.92, 95% CI 1.05-5.42 OR 4.7, 95% CI 2.07-10.68 OR 3.19, 95% CI 1.62-6.31