Supplementary Tables

Table 1. Criteria that represent the methodological quality of the reviewed studies

Author/ year	Avoided contamination and co-intervention	Random assignment to conditions	Blinded assessment	Monitored intervention	Accounted for all subjects	Reported reliability of measures used	Reported validity of measures used	Follow-up	Total number of criteria met
Koh et al. [39], 2013	No	Yes	Yes	Yes	Yes	Yes	Yes	No	6
Ma et al. [40], 2013	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	7
Doner et al. [41], 2013	No#	Yes	No#	Yes	Yes	Yes	Yes	Yes	6
Chen et al. [42], 2014	No#	Yes	Yes	Yes	No	No	No	Yes	4
Ibrahim et al. [28], 2014	No#	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7
Paul et al. [43], 2014	No#	Yes	Yes	Yes	Yes	Yes	Yes	No	6
Vahdatpour et al. [44], 2014	No#	Yes	No#	Yes	No	Yes	Yes	Yes	5
Russel et al. [45], 2014	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8
Soliman et al. [46], 2014	No#	Yes	No#	Yes	Yes	No	No	Yes	4
Akbaş et al. [47], 2015	No#	Yes	Yes	Yes	Yes	No	No	No	4
Ali & Khan [48], 2015	No#	Yes	No#	Yes	No	No	No	No	2
Espinoza et al. [49], 2015	No#	Yes	Yes	Yes	Yes	Yes	Yes	No	6
Hsu et al. [50], 2015	No#	Yes	Yes	Yes	No	Yes	Yes	Yes	6
Kim et al. [51], 2015	No#	Yes	Yes	Yes	Yes	No	No	Yes	5
Klç et al. [52], 2015	No#	Yes	No#	Yes	Yes	No	No	Yes	4
Balci et al. [53], 2016	No#	Yes	No#	Yes	Yes	No	No	No	3
Celik & Kaya Mutlu [1], 2016	Yes	Yes	Yes	Yes	No	No	No	Yes	5
Çelik & Türkel [27], 2016	No#	Yes	Yes	Yes	No	No	No	Yes	4
Ekim et al. [54], 2016	Yes	Yes	Yes	Yes	Yes	No	No	Yes	6
Elhafez & Elhafez [55],	No#	Yes	Yes	Yes	No	Yes	Yes	Yes	6

2016									
Hussein & Donatelli [56], 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8
Ebadi et al. [57], 2017	No[#]	Yes	No[#]	Yes	No	No	Yes	Yes	4
Kouser et al. [58], 2017	No[#]	Yes	No[#]	No	No[#]	No	No	No	1
Rawat et al. [59], 2017	No[#]	Yes	Yes	Yes	Yes	Yes	Yes	No	6
Robinson et al. [60], 2017	Yes	Yes	Yes	Yes	Yes	No	No	Yes	6
Balci et al. [61], 2018	No[#]	Yes	No[#]	Yes	Yes	No	No	Yes	4
AbdElhamed et al. [62], 2018	No[#]	Yes	No[#]	Yes	Yes	No	No	No	3
Duzgun et al. [63], 2019	No[#]	Yes	Yes	Yes	Yes	Yes	No	No	5
Jellad et al. [64], 2019	No[#]	Yes	Yes	Yes	No	No	No	Yes	4
Mohamed et al. [65], 2019	No[#]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7
Park et al. [66], 2014	No	No	No	Yes	No	No	No	Yes	2
Ip & Fu [67], 2015	Yes	No	No	Yes	Yes	No	No	Yes	4
Shih et al. [68], 2017	No	No	No	Yes	No	Yes	No	No	2

Table 2. Appraisal and recommendation criteria

Criteria for assessment of methodological rigor of the studies	
Confounding factors	
Random assignment	
Blinded assignment	
Monitored intervention	
Dropout report	
Reliability of measurements	
Validity of measurements	
Follow up	
Level of evidence	
Level I	Large randomized controlled trial, low error risk
Level II	Small randomized controlled trial, moderate to high error risk
Level III	Non-randomized design
Level IV	Case series, no control
Level V	Case report
Grade of recommendation	
Grade A	Supported by at least one level I study
Grade B	Supported by at least one level II study
Grade C	Supported by level III, IV or V evidence

Table 3. Details of basic information, study designs, interventions and outcomes employed in the reviewed studies

Author/year	Design and level of evidence (LOE)	Patient characteristics and duration of symptoms (DOS)	Interventions	Outcome measurements and assessments	Results	Sackett's critical appraisal criteria quality score (%)
Koh et al. [39], 2013	Design- RCT MOR-block randomization LOE- level II	n= 68, age= 54.35 ± 7.21 yrs females = 48 – Group 1- BV1 (n=22; M-6, F-16), age= 54.95 ± 6.79 yrs, DOS= 6 months – Group 2- BV2 (n=23; M-8, F-15), age= 56.18 ± 6.70 yrs, DOS= 5.24 months – Group 3- NS (n=23; M-6, F-17), age= 55.13 ± 7.01 yrs, DOS= 6.65 months	Intervention and period – Group 1- 1: 10,000 concentration BVA + PT – Group 2: 1: 30,000 concentration BVA + PT – Group 3: NS injection+ PT – All patients received PT – TENS (15 min) – Transcutaneous infrared thermotherapy (15 min) (two times a wk) – Manual physical therapy (15 min)-once a wk – Home exs- two times daily	– SPADI questionnaire – Pain using VAS – Active/ passive ROM using BTE primus Assessments: – Baseline – 2 wks – 4 wks – 8 wks – 12 wks	– All groups had significant improvements over the time in SPADI and VAS scores and ROM – BV1 group was significantly improved in SPADI score and VAS score at rest and during motion than NS group – No significant difference between BV1 and BV2 groups in SPADI and VAS scores – No significant difference among the 3 groups in ROM values	– 75%
Ma et al. [40], 2013	Design- RCT MOR-sealed envelopes	n= 30, age= 57.2 ± 6.6 yrs females = 24	Interventions and period – Group 1- PT modalities + passive joint mobilization + WBC	– Pain using VAS – Active ROM – ASES	– Significant improvements in all outcome measures after treatments	– 87.5%

	LOE- level II	– Group 1- WBC group (n=15; M-2, F-13), age= 56.1 ± 6.3 yrs, DOS= 4.3 ± 1.2 wks – Group 2- Non-WBC group (n=15; M-4, F-11), age= 54.9 ± 6.70 yrs, DOS= 5.3 ± 1.5 wks	– Group 2- PT modalities + passive joint mobilization – PT – Hot packs (15 min) – Ultrasound- (5 min) – Interferential current- (15 min) – SJ mobilization – WBC (-50°C and -110°C) – Six 4 min exposure per wk (twice a day, 3 times a wk over 4 consecutive wks)	Assessments: – Baseline – Post intervention (after 4 wks)	compared to baseline parameters in both groups – Significant difference noted in post-intervention in all outcome measures in group 1	
Doner et al. [41], 2013	Design- RCT MOR-random number table LOE- level II	n= 40, age= 58.90 ± 8.77 yrs females = 31 – Group 1- HP+ TENS+ stretching exs (n=20; M-2, F-18), age= 58.55 ± 8.57 yrs – Group 2- HP+ TENS+ Mulligan technique (n=20; M-7, F-13), age= 59.25 ± 9.17 yrs	Interventions and period – Group 1- HP+ TENS+ stretching exercises – Group 2- HP+ TENS+ Mulligan technique Interventions – HP (20 min) – TENS (20 min) – Stretching- (stretch for 30s and 15s rest period in between stretches) – Mulligan's technique- (three sets of 10 reps; 30s rest between sets) (five days/wk for three wks)	– Pain using VAS – Active/ passive ROM – CSS – SDQ – Patients' and physiotherapists' satisfaction Assessments: – Baseline – Post intervention – Third month	– Significant improvements in all outcome measures after treatments compared to baseline parameters in both groups – Significant improvements in the outcome measures in Group 2	– 75%

Chen et al. [42], 2014	Design- RCT MOR-computer generated randomization LOE- level II	n= 34, females = 23 – Group 1- Steroid group (n=17; M-6, F-11), age= 52.4 ± 8.2 yrs – Group 2- ESWT group (n=17; M-5, F-12), age= 56.18 ± 6.70 yrs	Intervention and period – Group 1- Steroid group – Group 2: ESWT group Interventions – All patients were asked to follow home based PT (10 reps for 3-4 times/day) – Steroid group- 30mg of oral Prednisolone daily for two wks and 15mg daily for another two wks – ESWT group- anterior, posterior and oblique directions at GHJ at first, 14th, 28th day of treatment(1350-1500 shots, 0.6mJ/mm^2, 1.25Hz)	– Functional outcomes using CSS and OSS Assessments: – Baseline – 2 wks – 4 wks – 6 wks – 12 wks	– Both groups had significantly improved with the OSS throughout study – ESWT group had significantly improved total CSS and the ROM parameter of CSS at 4th wk, ADL parameter at 6th wk compared to steroid group – Steroid group had significantly reduced pain from baseline to 4th wk, ADL and ROM from 4th-12th wk	– 50%
Ibrahim et al. [28], 2014	Design- RCT MOR- computerized random number generator LOE- level II	n= 60 females = 31 – Group 1- Experimental group (n=30), age= 51.9 yrs – Group 2- Control group (n=30), age= 51.2 yrs	Intervention and period – Group 1- SPS+ Traditional therapy – Group 2: Traditional therapy Interventions – Hot packs (10 min) – Manual therapy- physiological and accessory movements to the GHJ (10 min) – SPS- one 30 min session/day for 1stwk, two 30 minutes sessions/day for 2nd&	– Functional status by DASH questionnaire – Pain using VAS – Active/ passive ROM using goniometer Assessments: – Baseline – 4 wks – 12 wks	– Significant difference were noted in all outcome measures between the two groups after the intervention – At 12 months follow up, the differences were maintained and improved significantly in ROM, VAS and DASH scores in group 1 than group 2	– 87.5%

			3rdwks, three 30 minutes sessions/day for 4thwk All patients received home exercises	– 24 wks – 52 wks		
Paul et al. [43], 2014	Design- RCT MOR-computer generated randomization LOE- level II	n= 100 females = 35 – Group 1- Experimental group (n=50; M-32, F-18), age= 49.16 ± 6.09 yrs – Group 2- Control group (n=50; M-33, F-17), age= 53.22 ± 6.74 yrs	Intervention and period – Group 1- Counteraction+ PT – Group 2: PT Interventions – PT- Moist heat+ Mobilization (8-12 reps in four sets)+ UST/SWD (20 min/day, five days/wk for two wks) – Counteraction- Moist heat+ counteraction apparatus (10 minutes)+ GHJ mobilization (20 min/day, five days/wk for two wks)	– Shoulder score by OSS – Pain using VAS – ROM using goniometer Assessments: – Baseline – 2 wks	– ROM values and pain scores were improved in the experimental group after the intervention – Sixty percent of the subjects were improved to the fourth stage of satisfactory joint function according to the OSS in the experimental group compared to the control group	– 75%
Vahdatpour et al. [44], 2014	Design- RCT MOR-Random allocation software LOE- level II	n= 36 females = 25 – Group 1- Intervention group (n=19; M-6, F-13), age= 56.1 ± 10.6 yrs – Group 2- Control group (n=17; M-5, F-12),	Intervention and period – Group 1- ESWT+ analgesics+ exs – Group 2: 1: Sham ESWT+ analgesics+ exs Interventions – ESWT (once a wk for wks) – Activity modifications – Exercises	– Pain and disability score using SPADI questionnaire – ROM with goniometer – Assessments: – Baseline – 2 wks – 4 wks – 2 months	– Significant improvements in the outcome measures in the intervention group	– 62.5%

		age= 60.3 ± 4.8 yrs		after intervention – 5 months after intervention		
Russel et al. [45], 2014	Design- RCT MOR-computer generated permuted block randomization LOE- level II	n= 75, age= 51.1 yrs DOS= 5.79 months – Group 1- Exs class+ home exs (n=25) – Group 2- Individual multi-model PT+ home exs (n=24) – Group 3- Home exs alone (n=26)	Intervention and period – Group 1- Exs class+ home exs – Group 2- Individual multi-model PT+ home exs – Group 3- Home exs alone Interventions – Exs class- group therapy; 50 min exs circuit of 12 stations (each 4 min station) (twice/wk for 6 wks) – Multi-model PT (Maitland mobilization, soft tissue massage, myofascial trigger point release, heat, stretches – Home exs- specific shoulder exs, advice on sleep, posture & pain	– Shoulder function with CSS – OSS – Short form 36 (SF-36) questionnaire – HADS – ROM with standard universal goniometer Assessments: – Baseline – 6 wks – 6 months after intervention – 1 yr after intervention	– At 6 wks and 1 yr- exs class group improved with Constant & Oxford scores compared to group 2 & 3 – ROM- Significant improvement in forward elevation and external rotation in all groups after interventions. No significant difference between group 1 & 2, Significant difference between PT interventions (group 1 & 2) and group 3 – HADS score- No significant difference between group 1 & 2, Significant difference between PT interventions (group 1 & 2) and group 3 – SF-36- no	– 100%

					significant difference in domains except bodily pain, mental health and social function between groups	
Soliman et al. [46], 2014	Design- RCT MOR-Not mentioned LOE- level II	n= 40 females = 18 – Group 1- LLLT (n=20; M-6, F-14), age= 59.55 ± 3.03 yrs – Group 2- Reflexology (n=20; M-16, F-4), age= 57.7 ± 7.98 yrs	Intervention and period – Group 1- LLLT (15 minutes) – Group 2: Reflexology Interventions – Reflexology- in the form of thumb walk over the shoulder area, on the bottom of foot under the little toe (15 min) (three times/wk for 8 wks) – Exs program (10 times each for 15 min)	– ROM with the goniometer Assessments: – Pre-treatment – 4 wks post interventional – 8 wks post interventional	– No any significant difference in the ROM values between the two groups – LLLT group was significantly improved with abduction, flexion, internal & external ROM values after treatment compared to baseline – Reflexology group was significantly improved only with abduction ROM; external rotation values were less effective; internal rotation values were not significant; flexion vales were significantly lower compared to the baseline	– 50%
Akbaş et al. [47], 2015	Design- RCT MOR-random	n= 36, age= 54.35± 10.52 yrs,	Intervention and period – Group 1- Upper extremity	– Functional performance	– In both groups, pain during activity and	– 50%

	number table LOE- level II	DOS= 3.52 ±3.48 months females = 16 – Group 1- PNF group (n=18; M-11, F-7), age= 53.94 ± 9.38 yrs, – Group 2- Control group (n=18; M-9, F-9), age= 54.81 ± 11.96 yrs, DOS= 5.24 months	and scapular PNF+ conventional PT – Group 2: Conventional PT Interventions – Conventional PT- hot packs (20 min), UST (five min), wall arches and wand exs (10 times/ waking hour) – PNF- (five times/wk for 15 sessions)	by SPADI questionnaire – Pain using VAS (during rest, night and motion) – ROM (abduction, flexion, , external & internal rotation) using goniometer – Observation-based posture assessment – Scapula position by a tape measure – Lateral scapular slide test Assessments: – Baseline – After treatment	flexion and abduction ROM were significantly improved after treatments – No any significant difference in external and internal rotation ROM values in both groups – Pain during night was significantly reduced in study group but not in control group – Scapular positions were not changed significantly in both groups after treatment – SPADI scores reduced significantly in both groups	
Ali & Khan [48], 2015	Design- Randomized experimental study MOR-simple	n= 43 – Group 1- General exs + MT (n=22), age= 51.31 yrs	Intervention and period – Group 1- General exs + MT – Group 2: General exs therapy Interventions	– Shoulder function with disability index (SPADI) questionnaire	– All outcome measures were significantly improved in both groups after interventions	– 25%	

	randomization method LOE- level II	– Group 2- General exs therapy (n=21), age= 51.71 yrs	– General exs- flexion, abduction, stretches, crossover arm stretches, internal & external rotation stretches with &without towel, Codman pendulum exs – MT- Maitland mobilization technique on GHJ (grade II &III) (three days/wk for 5wks, each session- 45 min) – Both groups underwent home exs programme	– Pain using VAS – ROM using goniometer Assessments: – Baseline – 5 wks	– No significant difference in the outcome measures between the two groups	
Espinoza et al. [49], 2015	Design- RCT MOR-computer generated random number sequence LOE- level II	n= 57, DOS= five months females = 46 – Group 1- Control group (n=28; M-5, F-23), age= 53.3 ± 4.4 yrs, DOS= 5.2 ± 0.8 months – Group 2- Experimental group (n=29; M-6, F-23), age= 52.8 ± 4.70 yrs, DOS= 4.9 ± 0.8 months	Intervention and period – Group 1- Control group: conventional PT – Group 2- Experimental group: GHJ posterior mobilization+ cycle ergometer Interventions – Conventional PT- UST (10 min), self-assisted exs, Codman exs, Swiss ball exs, isometric exs – Experimental group- axial distraction type III (Kaltenborn) followed by posterior glide (15 times for 15 min) (10 sessions, 2-3times/wk)	– Functional status-CSS – Pain using VAS – Passive ROM with goniometer Assessments: – Baseline – 10th session	– Both groups improved in all the outcomes at the end of the treatment sessions – VAS and CSS were significantly improved in the experimental group	– 75%

Hsu et al. [50], 2015	Design- RCT MOR-random number table LOE- II	n= 66, age= 54.35 ± 7.21 yrs females = 51 – Group 1- PT group (n=33; M-8, F-25), age= 56.41 ± 9.44 yrs, DOS= 4.54 ± 3.25 months – Group 2- INJPT group(n=33; M-7, F-26), age= 54.88 ± 7.06 yrs, DOS= 6.12 ± 5.05 months	Intervention and period – Group 1- PT group – Group 2: PT+ injection group Interventions – PT- electrical therapy+ hot packs+ stretching exs+ joint mobilization (three times/wk for three months) – INJPT- 3ml of 1% lidocane (10-20 minutes; twice/wk)+ PT	– Pain and disability- SDQ and SPADI questionnaire – General health status- SF-36 – ROM with goniometer Assessments: – Baseline – 1 month – 2 months – 3 months – 4 months – 6 months	– Both active and passive ROM were improved in both groups after interventions – Significant improvements were noted only in flexion and internal rotation ROM values in INJPT group – SDQ and SPADI results were improved for both groups after interventions where significant improvements were noted for SDQ at 6 months and SPADI at 1 month in INJPT group – Quality of life was improved in both groups after intervention and there was no any significant difference between two groups	– 75%
Kim et al. [51], 2015	Design- RCT MOR-Permuted block randomization	n= 66, females = 12 – Group 1- HILT group	Intervention and period – Group 1- HILT group – Group 2: Placebo group Interventions	– Pain using VAS) – ROM using goniometer	– HILT group had significantly reduced pain score at three and 8 wks – No any significant	– 62.5%

	LOE- level II	(n=33; M-28, F-5), age= 57.5 ± 8.7 yrs, DOS= 6 ± 4.9 months – Group 2- Placebo group(n=33; M-26, F-7), age= 55.6 ± 7.9 yrs, DOS= 4.6 ± 2.7 months	– HILT- HILT (wave length= 1064nm, power=8000W, 120-150 µs) Both groups received – NSAIDs + self-stretching (3-5 times/day) (9 treatment sessions for three wks)	Assessments: – Baseline – 3 wks – 8 wks – 12 wks	difference was noted in pain score between the two groups at 12 months follow up – No any significant difference was noted in ROM, VAS score between two groups at serial follow ups	
Klç et al. [52], 2015	Design- RCT MOR- opaque sealed envelopes LOE- level II	n= 41, age= 55.05 ± 8.29 yrs females = 31 – Group 1- IG (n=19; M-4, F-15), age= 55.05 ± 8.29 yrs – Group 2- CG (n=22; M-6, F-16), age= 61.82 ± 9.39 yrs	Intervention and period – Group 1- IG (injection+ PT) – Group 2: CG (PT only) Interventions – PT- hot packs (20 min)+ TENS (20 min)+ US (10 min)+ Exs – IG- SSNB with the combination of (1 cc triamcinolone+ 9 cc prilocaine) before PT	– CSS – Pain- VAS – ROM with goniometer, external & internal rotation by position of the hand) – Strength by a spring dynamometer – Pain interference by BPI-SF Assessments: – Baseline – After 12 sessions	– Significant differences were found in all the parameters of BPI-SF in both groups compared to baseline except walking ability – Main mean pain severity, pain severity at that time, percentage improvement, general activity and enjoyment of life were significant in IG group,	– 50%

				– One month after the treatment		
Balci et al. [53], 2016	Design- RCT MOR-random number table LOE- level II	n= 53, females = 40 – Group 1- PNF group(n=18; M-4, F-14), age= 56.7 ± 7.7 yrs – Group 2- Classic exs group (n=18; M-3, F-15), age= 58.1 ± 8.4 yrs – Group 3- Control group (n=17; M-6, F-11), age= 58.6 ± 11.3 yrs	Intervention and period – Group 1- PNF+ PT modalities – Group 2: Exs+ PT modalities Group 3: PT modalities alone Interventions – PNF- scapular PNF (20 reps) – PT modalities- hot pack (20 min), TENS (20 min), US (3min) – Exs- stretching; wand & codman pendulum exs-4 reps each, strengthening; scapular elevation, stabilization, adduction- 20 reps each	– Scapular dyskinesis by LSST – Pain using VAS – Active ROM by goniometer – Functional status by SST Assessments: – Baseline – After intervention	– All groups had significant improvements in ROM and SST scores after interventions but no any significant difference between the groups – Significant difference was found in the VAS scores in PNF and control groups after the interventions – Any treatment method had no any significant effect on LSST results	– 37.5%
Celik & Kaya Mutlu [1], 2016	Design- RCT MOR-computer generated randomized table of numbers LOE- level II	n= 26, DOS= 15.7wks (14-21wks) females = 18 – Group 1- Stretching+ JM (n=12; M-3, F-9),	Intervention and period – Group 1- Stretching+ JM – Group 2- Stretching Interventions – JM- (I,II grades-first 2wks, III,IV grades-following 2wks; 30 min) – Stretching- intermittent stretching (10 times each for	– DASH questionnaire – CSS – Pain using VAS – ROM with conventional goniometry Assessments:	– Group 1 had greater improvements in ROM values for abduction and external rotation and increased constant score compared to group II – Small to moderate effect sizes noted	– 62.5%

		age= 54.2 ± 7.9 yrs, DOS= 16 ± 2.2wks – Group 2- Stretching (n=14; M-5, F-9), age= 54.8 ± 6.4 yrs, DOS= 15.4 ±2.0 wks	20 min) – Home exs- (10 reps each) (three times/wk; 18 sessions)	– Baseline – 6 wks – 1 yr after treatment	between the groups for significantly improved outcomes	
Çelik & Türkel [27], 2016	Design- RCT MOR-computer generated random number table LOE- level II	n= 43, age= 52.6 yrs females = 30 DOS= 15.7 (14-21wks) – Group 1- Matrix Rhythm Therapy group(n=21; M-5, F-16), age= 53.1 yrs (42-65 yrs) – Group 2- Stretching group (n=22; M-8, F-14), age=52.7 yrs (40-65 yrs)	Intervention and period – Group 1- Matrix Rhythm Therapy – Group 2: Stretching Interventions – Matrix Rhythm Therapy- for trapezius, latissimusdorsi, serratus anterior, supraspinatus, deltoid, biceps and triceps- 45 min (three times a wk- all 18sessions) – Stretching exs- intermittent stretching; (10-15 times each direction, for 20 min, three times a wk) Both groups had home exs – Self-stretching- (20 reps each direction, twice a day) – Strengthening exs (10 reps each direction, twice a day)	– Functional disability with CSS and DASH-T questionnaire – SF-36 questionnaire – GRC score – Passive ROM using a goniometer Assessments: – Baseline – 3 wks – 6 wks – 24 wks of follow up	– Both groups had significant improvements in all the outcome measures – Significant group-time interaction was found for CSS and SF-36 for patients receiving stretching exs at 24 wks follow up – Pair wise comparison showed that SF-36 at 6 wks and CSS at 3 and 6 wks follow up were greater in stretching group	– 50%

Ekim et al. [54], 2016	Design- RCT MOR- simple randomization by LOE- level II	n= 41 females = 26 – Group 1- CPM (n=20; M-7, F-13), age= 60.5 ± 8.1 yrs, DOS= 10.5 (6.3-16.5)months – Group 2- CPT (n=21; M-8, F-13), age= 60.4 ± 6.7 yrs, DOS= 8 (6-12)months	Intervention and period – Group 1- CPM – Group 2: CPT Interventions – CPM: adduction/abduction angle: 0-30˚-175˚, internal/external rotation: 90˚-0-90˚, flexion/elevation: 0-30˚-175˚, horizontal adduction/abduction: 0-0-125˚ (five days/wk for four wks) – CPT: active stretching, ROM exs, pendulum exs All patients received PT modalities+ home exs – Hot pack- (20 min) – UST- (five min) – TENS- 20 (min) – Home exs- pendulum and passive ROM exs	– Pain and functional status by CSS and SPADI questionnaire – Pain using VAS – Active/ passive ROM Assessments: – Baseline – 4 wks – 12 wks	– Both groups had significantly improved with ROM, VAS measures, SPADI pain and disability scores and CSS scores – The improvements were more prominent in the CPM group compared to CPT	– 75%
Elhafez & Elhafez [55], 2016	Design- RCT MOR-random envelopes LOE- level II	n= 45 females = 27 – Group A- UST+ laser (painful points)+ exs (n=15; M-6, F-9), age= 50.4 ± 5.3 yrs, DOS=	Intervention and period – Group A- UST+ laser (painful points)+ exs – Group B- UST+ laser (axillary region)+ exs – Group C- UST+ laser (axillary region)+ MET Interventions – UST- 10 min – Laser: 20 min (Group A-	– Pain using numeric pain scale – ROM using baseline bubble inclinometer Assessments: – pretreatment – immediately	– All groups had significant improvements in pain and ROM after interventions and the greatest improvements were in group C – Improvements order was in A<B<C order	– 75%

			5.86 ± 1.59 months – Group B- UST+ laser (axillary region)+ exs (n=15; M-7, F-8), age= 50.06 ± 4.3 yrs, DOS= 6.2 ± 1.74 months – Group C- UST+ laser (axillary region)+ MET(n=15; M-5, F-10), age= 49.5 ± 4.6 yrs, DOS= 6.4 ± 1.68 months	lateral and anterior borders of the acromian, Group B & C- axillary area – Exs- – MET- (three sessions/wk for 4 wks)	– -post-treatment – 4 wks of treatment		
Hussein & Donatelli [56], 2016	Design- RCT MOR-computer generated randomized list LOE- level II	n= 106, age= 39-77 yrs, DOS= 9-14 months females = 66 – Group 1- Experimental group(n=53; M-21, F-32), age= 55.83 ± 1.34 yrs, DOS= 11.60	Intervention and period – Group 1- rESWT group – Group 2- placebo rESWT group Interventions – rESWT group (four applications, one wk apart) Both groups received home-based exs programme	– Functional status by DASH questionnaire – Pain using VAS – Active/ passive ROM Assessments: – Baseline – 4 wks	– Significant improvements were noted in all the outcome measures in the experimental group after the intervention compared to placebo group	– 100%	

		± 0.18 months – Group 2- Control group (n=53; M-19, F-34), age= 55.81 ± 1.29 yrs, DOS= 11.55 ± 0.17 months		– 24wks		
Ebadi et al. [57], 2017	Design- RCT MOR-simple randomization by sealed opaque envelopes LOE- level II	n= 50, age= 49.74 ± 7.0 yrs, DOS= 5.36 ± 1.9 months females = 30 – Group 1- UST(n=25; M-10, F-15), age= 50.56 ± 8.06 yrs, DOS= 5.24 ± 1.96 months – Group 2- Sham UST(n=25; M-10, F-15), age= 48.92 ± 5.81 yrs, DOS= 5.48 ± 1.87	Intervention and period – Group 1- UST – Group 2: Sham UST – Interventions – UST- (6 min) Both groups had exercises – Stretching: – Strengthening exs: – Maitland mobilization – PNF techniques (contract-relax)	– Functional ability using OSS – Pain using VAS – ROM with a goniometer Assessments: – Baseline – After 10 sessions – Three months follow up	– No any significant interaction effect of time and group was noted for all the outcome measures	– 50%

		months				
Kouser et al. [58], 2017	Design- RCT MOR randomization according to the day enrolled LOE- level III-1	n= 37, age= 50.11 ± 6.33 yrs – Group 1- control group (n=19), age= 50.11 ± 6.6 yrs, DOS= 36.48% have <1 yr – Group 2- experimental group (n=18), age= 56.18 ± 6.70 yrs, DOS= 16.67% have <1 yr	Intervention and period – Group 1- Mid range mobilization – Group 2: End range mobilization Interventions – All patients received conventional PT and home exs – Conventional PT; TENS+ hot pack (10 min)+ scapular mobilization – Home exs – Mid-range mobilization; mid-range Kaltenborn mobilization (10 reps in three sets)+ conventional PT+ home exs – End range mobilization; end range Kaltenborn mobilization (10 reps in three sets)+ conventional PT (10 sessions for two wks)	– Functional status using SPADI questionnaire – ROM using goniometer Assessments: – Baseline – 2 wks	– Significant improvements were noted for ROM, SPADI scores but not for pain scores in end range mobilization group compared to mid range group	– 12.5%
Rawat et al. [59], 2017	Design- RCT MOR-block randomization by sequentially numbered, sealed, opaque envelopes	n= 42, females = 18 – Group 1- Control group (n=21; M-14, F-7), age= 54.19 ± 8.33 yrs,	Intervention and period – Group 1- TENS+ mobilization – Group 2: TENS+ mobilization+ rotator cuff strengthening Interventions	– Functional disability using SPADI & PSFS questionnaires – Pain using VAS – ROM using	– Significant improvements were identified in all the outcome measures after the treatments in the group who had strengthening exs	– 75%

	LOE- level II	DOS= 3.83 ± 2.2 wks – Group 2- Experimental group (n=21; M-10, F-11), age= 56.00 ± 10.42 yrs, DOS= 5.52 ± 3.7 wks	– GHJ mobilization – Scapular mobilization (10-15 reps for all mobilizations) – TENS (15min) – Rotator cuff strengthening (8-12 reps for three sets in one session and for 12 sessions) – Home exs-	goniometer – Muscle strength using hand held dynamometer Assessments: – Baseline – 4 wks		
Robinson et al. [60], 2017	Design- RCT MOR-sealed opaque envelopes LOE- level II	n= 41 females = 28 – Group 1- PT+ home exs (n=20; M-7, F-13), age= 57.9 (53.2- 62.5) yrs , DOS= 8.5 (7.2- 9.7) months – Group 2- home exs (n=21; M-6, F-15), age= 55.2 (52.5- 58.0) yrs, DOS= 6.5 (5.5-7.5) months	Intervention and period – Group 1- PT+ home exs – Group 2: home exs – All patients received Hydro-dilatation before interventions Interventions – PT- advice, exs therapy, manual therapy, therapist-applied passive stretches, GHJ accessory & physiological mobilizations, cervical & thoracic spine accessory mobilizations (20 min, once/wk for four wks) – Home exs programme-	– OSS – EQ-5D index – Pain using VAS – Active/ passive ROM using goniometer and internal rotation with the hand placement Assessments: – Baseline – 4 wks – 3 months – 6 months – 1 yr	– All the outcome measures were improved significantly from baseline to four wks in both groups – No any significant difference between the groups at any time point according to the OSS and EQ-5D index	– 75%
Balci et al. [61],	Design- RCT	n= 30, age=	Intervention and period	– Functional	– Significant	– 50%

2018	MOR-Random number generator LOE- level II	55.66 ± 8.2 yrs female = 16 – Group 1- Active UST (n=15; M-7, F-8), age= 55.33 ± 6.59 yrs, DOS= 22 ± 14.81 wks – Group 2- Sham UST (n=15; M-7, F-8), age= 56.00 ± 9.81 yrs, DOS= 21 ± 10.72 wks	– Group 1- Active UST+ PT – Group 2: Sham UST+ PT Interventions – UST- (8 min) – PT- TENS (20 min)+ hot packs (20 min)+ exs therapy	status by UCLA questionnaire & SDQ – Pain using VAS – Active/ passive ROM using goniometer Assessments: – Baseline – 6 wks – 24 wks	– All the outcomes except pain were improved at 24thwk compared to 6thwk but no any difference noted in between the groups	
AbdElhamed et al. [62], 2018	Design- RCT MOR-shuffled deck of cards LOE- level II	n= 30, age= 40-60 yrs – Group A- Traditional PT (n=15), age= 26.06 ± 3.39 yrs – Group B- Traditional PT+ Lower Trapezius strengthening exs (n=15), age= 25.06 ±	Intervention and period – Group 1- Traditional PT – Group 2: Traditional PT+ Lower Trapezius strengthening exs Interventions – Traditional PT- UST (10 min), mobilization (4-5 min, 10 reps for three sets), home exs (10 reps for three sets) – Lower Trapezius strengthening exs- modified prone cobra (10 times), prone V-raise exs (10 times)	– Scapular tipping using (A-T) distance test Assessments: – Baseline – 4 wks	– Significant improvements were noted in scapular tipping (A-T) distance from supine, supine with scapular retraction, standing, standing with scapular retraction positions in group B compared to group A after the treatment – Significant difference in	– 37.5%

		3.36 yrs	(three sessions/wk for four wks)		scapular tipping was noted between baseline and post-treatment only in group B	
Duzgun et al. [63], 2019	Design- RCT MOR-random number table LOE- level II	n= 54, age= 51.5 ± 8.2 yrs – Group 1- Scapular mobilization (n=27), age= 51.2 ± 9.08 yrs – Group 2- Posterior capsular stretching (n=23), age= 53.04 ± 7.8 yrs – Group 3- Scapular mobilization + Posterior capsular stretching (n=54), age= 51.5 ± 8.2 yrs	Intervention and period – Group 1- Scapular mobilization – Group 2: Posterior capsular stretching – Group 3: Scapular mobilization+ Posterior capsular stretching After the first treatment the groups were crossed and were reassessed (Group 3) Interventions – Scapular mobilization- (10 times each) – Posterior capsular stretch- (20s each for 10 times)	– Pain using VAS (during rest and motion) – Active/ passive ROM using a goniometer – Posterior capsular tension (length)- using arm positions by a ruler Assessments: – Baseline – Immediately after interventions	– All groups had significant improvements in ROM values except internal rotation after the interventions – No any significant difference noted among the groups – Posterior capsular flexibility was not improved significantly in any group	– 62.5%
Jellad et al. [64], 2019	Design- RCT MOR- Randomization table	n= 122, females = 74 – Group A- IAD followed by	Intervention and period – Group A- IAD followed by PT – Group B: IAD preceded by PT	– Functional status by DASH questionnaire – Pain using	– IAD followed by PT group was significantly improved with upper extremity function but not with pain	– 50%

	LOE- level II	PT (n=34; M-12, F-22), age= 55.7 ± 9.80 yrs, DOS= 6 ± 3.5 months – Group B- IAD preceded by PT (n=46; M-21, F-25), age= 55.1 ± 7.70 yrs, DOS= 4.4 ± 3.4 months – Group C- PT alone (n=42; M-15, F-27), age= 55.0 ± 10.4 yrs, DOS= 5.1 ± 3.3 months	– Group C: PT alone Interventions – Group A; IAD- 2 cm^3 of sodium and meglumineioxaglate, 81 8 cm^3 of a 1% refrigerated Xylocaine and finally 1 to 82 1.5 cm3 of local corticoid – Group B; After 15 sessions of PT+ IAD+ PT – PT- pendulum exs, passive supine forward elevation, passive external rotation, active assisted ROM in extension, horizontal adduction, internal rotation (three sessions/wk for 12 wks)	VAS – ROM using goniometer Assessments: – Baseline – 6 wks – 12 wks	score – Regardless of the protocol, upper extremity function and pain was improved with the time	
Mohamed et al. [65], 2019	Design- RCT MOR-random blocks using computer software LOE- level II	n= 60 females = 26 – Group 1- Study group (n=30; M-18, F-12), age= 51.93 ± 6.16 yrs – Group 2- Control group (n=30; M-16, F-14),	Intervention and period – Group 1- Dynamic scapular recognition exs – Group 2: Placebo treatment – All patients received – Hot packs (20 min), Scapular mobilization (five min) Interventions – Placebo treatment- active	– Pain & disability using SPADI questionnaire – Scapular upward rotation by a digital inclinometer – ROM by a digital inclinometer	– After two wks, a significant improvements were noted in scapular upward rotation, shoulder abduction & flexion in group 1 and no significant difference in shoulder external rotation and SPADI score between two groups	– 87.5%

		age= 50.06 ± 5.87 yrs	ROM exs (20 reps/set, five sets/session) – Dynamic scapular recognition exs- by audible biofeedback device (20 min) (40 min, three session/wk for two months)	Assessments: – Baseline – 2 wks – 2 months – 6 months	– After two and six months of treatment, significant differences were noted in all outcome measures in group 1 than the placebo group	
Park et al. [66], 2014	Design- Retrospective cohort study LOE- level III-2	n= 60, age= 54.35 ± 7.21yrs females = 42 – Group 1- BV1 (n=20; M-6, F-14), age= 55.4 ± 6.8 yrs, DOS= 6.8 months – Group 2- BV2 (n=22; M-8, F-14), age= 52.8 ± 7.3 yrs, DOS= 5.9 months – Group 3- NS (n=18; M-4, F-14), age= 56.4 ± 7.9 yrs, DOS= 6.7 months	Intervention and period – Group 1- 1: 10,000 concentration BVA + PT – Group 2: 1: 30,000 concentration BVA + PT – Group 3: NS injection+ PT – All patients received Physical Therapy – TENS (15 min) – Transcutaneous infrared thermotherapy (15 min) (two times a wk) – Manual physical therapy (15 min)-once a wk – Home exs- two times daily	– SPADI questionnaire – Pain using VRS – Treatment satisfaction using likert scale – Patient recommendation of therapy using likert scale Assessments: – Baseline – After one yr	– SPADI scores were significantly differed between BV1 and control group at one yr – Significant differences were not noted in VRS scores between groups after one yr – BV1 and BV2 groups showed high satisfaction and tended to recommend the treatments more than the control group	– 25%
Ip& Fu [67], 2015	Design- Prospective	n= 35, age= 65 (60-77) yrs,	Intervention and period LLLT- subacromial space,	– CSS Assessments:	– All patients except two patients had significant	– 50%

	cohort study LOE- level III-2	male: female= 1.0:1.3	biceps anchor, axillary pouch, anterior & posterior shoulder capsule, rotator interval and two acupuncture points (three sessions/wk for 8 wks)	– Baseline – 8 wks – One yr – Two yrs	improvements in CSS after the treatment and it was maintained at one yr and two yrs follow ups	
Shih et al. [68], 2017	Design- Cross sectional exploratory studies LOE- level IV	n= 40 females = 24 – Group 1- FS group (n=20; M-8, F-12), age= 52.85 ± 5.95 yrs, DOS= 8.08 ± 3.09 months – Group 2- Asymptomatic group (n=20; M-8, F-12), age= 53.15 ± 7.14 yrs	Intervention and period – Group 1- FS group – Group 2: Asymptomatic group Interventions FS group – Electrical heating pad (15 min) – Manual muscle release (PM, UT, ISp, TM, PD for 30 min) – 10 min warm up with a hand cycle	– Muscle activity by Telemetric EMG system – Shoulder kinematics by Liberty electromagnetic tracking system – Pain using VAS – Active/ passive ROM (abduction, flexion, external & internal rotation) by goniometer Assessments: – Baseline – After intervention	– FS group had been significantly reduced with LT and ISp muscle activity during the scaption task and increased PM activity during thumb to waist task – Muscle release intervention had immediately reduced the pain levels, improved muscle activity during scaption and hand to neck task, increased peak humeral elevation and scapular PT during scaption and increased scapular PT during hand to neck task	– 25%

RCT= Randomized controlled study, MOR= Method of randomization, LOE= Level of evidence, DOS= Duration of symptoms, BVA= Bee venom acupuncture, NS= Normal saline, PT= Physical therapy, Exs= Exercise, SPADI= Shoulder pain and disability index, VAS= Visual analogue scale, ROM= Range of motion,

AC= adhesive capsulitis, WBC= Whole body cryotherapy, ASES= American Shoulder and Elbow Surgeons Standardized Shoulder Assessment, GHJ= Gleno-humeral joint, STJ= Scapulo-thoracic joint, HP= Hot pack, TENS= Trans cutaneous electrical nerve stimulation, SDQ= Shoulder disability questionnaire, ESWT= Extra corporeal shock wave therapy, CSS= Constant shoulder score, ADL= Activities of daily living, SPS= Static progressive stretch device, DASH= Disabilities of arm, shoulder and hand questionnaire, OSS= Oxford shoulder score, UST= Ultrasound therapy, SF-36= General health status was measured by using short form healthy survey-36, SWD= Short wave diathermy, LLLT= Low level laser therapy, DM= Diabetes mellitus, PNF= Proprioceptive neuromuscular facilitation, MT= Manual therapy, JM= Joint mobilization, GRC- Global rating of change score, rESWT= Radial extra corporeal shock wave therapy, HILT= High intensity laser therapy, SSNB= Supra scapular nerve block, SST= Simple shoulder test, CPM= Continuous passive motion, CPT= Conventional physical therapy, PSFS= Patient-Specific Functional Scale questionnaire, UCLA= University of California and Los Angeles shoulder scale, IAD= Intra articular distension, FS= Frozen shoulder, EMG= Electro-myography, LT= lower trapezius, ISp= Infraspinatus, PM= Pectoralis major, TM= Teres major, BTE= Baltimore therapeutic equipment work stimulator.