Table SI. PRISMA checklist

Section and Topic	#	Checklist item	Location
TITLE			
Title	1	Identify the report as a systematic review.	Title
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Abstract
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Introduction
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Introduction
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Methods
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Methods
Search strategy	7	Present the full search strategies for all databases, registers, and websites, including any filters and limits used.	Methods Table S2
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Methods

Section and Topic	#	Checklist item	Location
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Methods
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g., for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Methods Table S4
	10b	List and define all other variables for which data were sought (e.g., participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Methods Table S4
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Methods
Effect measures	12	Specify for each outcome the effect measure(s) (e.g., risk ratio, mean difference) used in the synthesis or presentation of results.	Methods
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g., tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Methods
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Methods
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Methods
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Methods
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g., subgroup analysis, meta-regression).	Methods

Section and Topic	#	Checklist item	Location
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Methods
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	N/A
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Results Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Table S3
Study characteristics	17	Cite each included study and present its characteristics.	Results Table 1
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Results Table 2
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Results Figure S1-S21
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Results
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g., confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Results Figure S1-S21

Section and Topic	#	Checklist item	Location
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Results Figure S14-S21
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Results Figure S22-S25
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	N/A
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Discussion
	23b	Discuss any limitations of the evidence included in the review.	Discussion
	23c	Discuss any limitations of the review processes used.	Discussion
	23d	Discuss implications of the results for practice, policy, and future research.	Discussion
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Methods
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Methods
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Funding

Section and Topic	#	Checklist item	Location
			statement
Competing interests	26	Declare any competing interests of review authors.	Conflict of interests
Availability of data, code and other material	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Results

Table SII. Keywords and search results in different databases

Database	Keyword	Filter	Date	Results
PubMed	(‘ultrasound’ OR ‘sonography’ OR ‘ultrasonography’) AND (‘stroke’ OR ‘post-stroke’ OR ‘hemiplegic’) AND (‘shoulder’ OR ‘upper limb’ OR ‘arm’)	Title Abstract	2022/12/9	228
Embase	(‘ultrasound’ OR ‘sonography’ OR ‘ultrasonography’) AND (‘stroke’ OR ‘post-stroke’ OR ‘hemiplegic’) AND (‘shoulder’ OR ‘upper limb’ OR ‘arm’)	Title Abstract	2022/12/9	515
Web of Science	(‘ultrasound’ OR ‘sonography’ OR ‘ultrasonography’) AND (‘stroke’ OR ‘post-stroke’ OR ‘hemiplegic’) AND (‘shoulder’ OR ‘upper limb’ OR ‘arm’)	Abstract	2022/12/9	208
ClinicalTrials.gov	(‘ultrasound’ OR ‘sonography’ OR ‘ultrasonography’) AND (‘stroke’ OR ‘post-stroke’ OR ‘hemiplegic’) AND (‘shoulder’ OR ‘upper limb’ OR ‘arm’)	Condition or disease	2022/12/9	17

Table S3. Excluded studies and the pertinent reasons

Reasons	References
Not reporting specific shoulder pathologic findings	[1-13]
Not evaluating shoulder structures	[14-17]
Only recruited patients with lower motor function	[18,19]

Table S4. Details of data extraction from included clinical trials

Author, year	Details of data extraction from included studies
Studies only evaluating the hemiplegic shoulder	
Pong et al., 1009	1. Participants' age was from Table 1. The time since stroke onset were from the first paragraph of Results. 2. The study divided patients into high motor function group (Brunnstrom Stage I, II, III) and low motor function group (Brunstrom Stage IV, V, VI). 3. The ultrasound findings at admission were extracted from Table 2.
Huang et al., 2010	1. Age and time since stroke onset were from Table I. 2. The study divided patients into high motor function group (Brunnstrom Stage I, II, III) and low motor function group (Brunstrom Stage IV, V, VI). 3. Ultrasound finding were from Table III.
Kim et al., 2011	1. This article was written in Korean. 2. Age and time since stroke onset were from Table 1. 3. Ultrasound findings were from Table 3. 4. Participants were categorized into first recovery stage (Brunnstorm stage I, II), second recovery stage (Brunnstorm stage III, IV) and third recovery stage (Brunnstorm stage V, VI). For the analysis of high vs. low motor function, we extracted data of the first recovery stage for the low motor function group and the third recovery stage for the high motor function group.
Pompa et al., 2011	1. Age and time since stroke onset were from Table 1. 2. Participants were categorized into two groups as having hemiplegic shoulders with and without pain. 3. Ultrasound findings were from Table 2.
Zaiton et al., 2011	1. Age and time since stroke onset were from Table 2. 2. Ultrasound findings were from Table 3. 3. The number of rotator cuff pathologies were the sum of partial- and full-thickness tears. The number of biceps tendon pathologies were picked as the more prevalent, between biceps tendon effusion and tendinitis.
Pong et al., 2012	1. Age and time since stroke onset were from the first paragraph of Results. 2. The ultrasound findings at the acute stage were extracted from Table III.

Rah et al., 2012	1. All participants had hemiplegic shoulder pain and rotator cuff disorder. 2. Age and time since stroke onset were from Table 1. 3. The ultrasound findings were from Table 1. The number of biceps tendon pathologies were picked as the more prevalent, between biceps tendon effusion and partial tear. Number of rotator cuff pathologies were picked as the most prevalent, among rotator cuff tendinosis, partial-thickness tear, and calcification.
Doğun et al, 2014	1. All participants had hemiplegic shoulder pain. 2. Age and time since stroke onset were from the first paragraph of Results. 3. The ultrasound findings were from Table 1 and Table 2.
Huang et al., 2017	1. All participants had hemiplegic shoulder pain. 2. Age and time since stroke onset were from Table I. 3. The ultrasound findings before treatment were extracted from Table III.
Huang et al., 2018	1. All participants had hemiplegic shoulder pain. 2. Age and time since stroke onset were from Table 1. 3. The ultrasound findings were from Table 3. The number of pathologies at each anatomical site was picked as the more prevalent, between tendinitis/tear and hyperemia.
Lin et al., 2017	1. All participants had hemiplegic shoulder pain. 2. Age and time since stroke onset were from Table 1. 3. The ultrasound findings were from Table 2.
Korkmaz et al., 2020	1. All participants had hemiplegic shoulder pain. 2. Age and time since stroke onset were from Table 1. 3. The ultrasound findings were from Table 3. The number of biceps tendon pathologies were picked as the most prevalent, among biceps tenosynovitis, tendinitis, and subluxation.
Arya et al.., 2021	1. Stroke patients with shoulder subluxation were included. 2. Age and time since stroke onset were from Table 1. 3. The ultrasound findings were from Table 2.

El-Sonbaty et al., 2022	1. Age and time since stroke onset were from Table 1. 2. Participants were categorized into two groups as having hemiplegic shoulder pain or not. 3. The ultrasound findings were from Table 1.
Studies comparing bilateral shoulders	
Lee et al., 2002	1. Age and time since stroke onset were from the first paragraph of Results. 2. The ultrasound findings were extracted from the third, fourth, fifth and sixth paragraphs of Results.
Park et al., 2007	1. Stroke patients with shoulder subluxation were included. 2. Age was from the Patients section of Material and Methods. 3. Time since stroke onset was from the Procedures section of Material and Methods. 4. The ultrasound findings were from the second paragraph of Results.
Baek et al., 2009	1. The article was written in Korean 2. Time since stroke onset was from the first paragraph of Results. 3. The ultrasound findings were from Table 1. The number of supraspinatus pathologies was the sum of supraspinatus partial- and full-thickness tears. The number of subscapularis pathologies was picked as the more prevalent, between partial-thickness tear and calcification. The number of biceps tendon pathologies was picked as the more prevalent, between biceps tendon swelling and subluxation. The number of acromioclavicular joint pathologies was picked as the most prevalent, among joint swelling, denegation, and subluxation.
Lee et al., 2008	1. Age and time since stroke onset were from the Patients section of Subjects and Methods. 2. The ultrasound findings were extracted from the first and second paragraphs of Results.
Huang et al., 2012	1. Stroke patients with shoulder subluxation were included. 2. Age and time since stroke onset were from the first paragraph of Results. 3. The ultrasound findings were from Table II. The number of pathologies at each anatomical site was picked as the more prevalent, between tendonitis and tear/rupture.

Pop et al., 2013	1. The article was written in both English and Polish. 2. All participants had hemiplegic shoulder pain. 3. Age and time since stroke onset were extracted from the third paragraph of Material and Methods. 4. The numbers of subdeltoid bursa effusion was extracted from the fourth paragraph of Results.
Yi et al., 2013	1. All participants had hemiplegic shoulder pain. 2. Age and time since stroke onset were from Table 1. 3. The ultrasound findings were from Table 2.
Mohamed et al., 2014	1. All participants had hemiplegic shoulder pain. 2. Age and time since stroke onset were from the first paragraph of Results and Table 1. 3. The ultrasound findings were from Table 3. The number of supraspinatus pathologies was picked as the most prevalent, among supraspinatus tendinosis, partial- and full-thickness tears.
Idowu et al., 2017	1. Age and time since stroke onset were extracted from the first two paragraphs of Results. 2. The ultrasound findings were from Table 4. The number of biceps tendon pathologies was picked as the most prevalent, among biceps tendon effusion, tendinosis, and degeneration. The number of supraspinatus pathologies was picked as the more prevalent, between supraspinatus tear and tendinosis.

References

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