https://doi.org/10.1186/s12891-025-08566-3

Ye et al. BMC Musculoskeletal Disorders

Open Access

Platelet-rich plasma and corticosteroid injection for tendinopathy: a systematic review and meta-analysis

Zifeng Ye^{1,2}, Yiwei Yuan¹, Gaoyan Kuang², Liguo Qiu^{1,2}, Xuyi Tan³, Zhi Wen^{1,2} and Min Lu^{2*}

(2025) 26:339

Abstract

Objective In this systematic review and meta-analysis, we evaluated and compared the efficacy and safety of platelet-rich plasma injection into corticosteroid injection in the treatment of tendinopathy.

Methods We searched PUBMED, EMBASE, Cochrane Library, SCOPUS, and Web of Science to identify randomized controlled trials on the PRP injection versus CS injection in treatment of tendinopathy. The meta-analysis was performed using the Revman 5.4 software.

Result We found 27 RCT studies with a total of 1779 patients enrolled. 8 rotator cuff injuries, 7 humeral external epicondylitis, 10 plantar fasciitis, and 2 tenosynovitis. The results of the meta-analysis showed that there were no significant group differences in the results of patients with rotator cuff injury comparing the pain visual analog scale score and functional measures at 1 month after receiving injection treatment. After three months of receiving PRP treatment, the VAS scores showed greater improvement compared to the CS group(OR=-1.64,95%CI [-2.97,-0.31],P=0.02), while there was no statistically significant difference in shoulder joint function between the two groups at the 3–6 month post-treatment mark. Patients with plantar fasciitis showed no significant differences in VAS and AOFAS scores after receiving PRP or CS injections at 1 and 3 months. However, at the 6-month mark, the PRP group demonstrated significantly better VAS and AOFAS scores compared to the CS group(OR=-1.41,95%CI [-1.88,-0.44],P<0.00001; OR=7.19,95%CI [2.41,11.91],P=0.003). 1 month after CS injection in patients with tenosynovitis, the VAS score was lower than that of the PRP group; patients with elbow epicondylitis had better improved upper limb function rating scale scores 1 month after CS injection compared to the PRP group. In patients with tenosynovitis, the VAS scores were superior to the CS group six months after PRP treatment(OR=-0.72,95%CI [-1.04,-0.40], P < 0.00001); similarly, patients with lateral epicondylitis exhibited better VAS, DASH scores than the CS group three and twelve months post-PRP treatment(OR = -9.76,95%CI [-10.89,-8.63],P = 0.0002; OR = -0.97,95%CI [-1.87,-0.06], P < 0.0001; OR = -18.03,95%CI [-31.61,-4.46], P = 0.009).

Conclusion PRP can effectively improve pain and functional impairment in patients with tendinopathy, and its midterm efficacy is superior to that of corticosteroids. However, the long-term efficacy remains to be further clinically verified.

Keywords Platelet-rich plasma, Corticosteroid, Tendinopathies, Systematic review, Meta-analysis

*Correspondence: Min Lu lumin6563@163.com Full list of author information is available at the end of the article



© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.

Introduction

Tendinopathy, a clinical syndrome, is characterized by persistent localized tendon pain and functional impairment. It is predominantly induced by repetitive mechanical loading, a phenomenon commonly termed "overuse." In contrast to tendon ruptures, tendinopathy is marked by abnormal tendon tissue with an intact tendon structure. Clinically, it is primarily manifested as pain, limitation of activity, and functional deficits [1, 2]. Tendinopathy, the most prevalent musculoskeletal disorder, has an etiology that remains elusive and is often precipitated by the complex interaction of various factors [3, 4]. Tendinopathy is categorized into two subtypes: tendonitis, which is characterized by inflammation, and tendon degeneration, which is distinguished by degenerative alterations in the tendon's structure [5–7].

Research indicates that there are various treatment methods for tendinopathy, encompassing physical therapy, non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroid injections(CS), and platelet-rich plasma (PRP) therapy. At present, corticosteroid injections are the predominant treatment for chronic tendinopathy, demonstrating efficacy in providing short-term alleviation. Studies indicate that corticosteroid injections are particularly effective in managing acute or subacute tendinitis, with the most favorable injection timing likely being within the initial weeks [8]. The combined application of hormones and local anesthetics exerts an anti-inflammatory effect, which can provide favorable short-term outcomes within a brief period. However, it fails to address the underlying tendon pathology or promote tendon healing and may even exacerbate tendinopathy. PRP, a biologic product derived from autologous peripheral blood, has the capacity to facilitate the healing of tendons, ligaments, and bones [9]. It has emerged as a novel therapeutic option in the management of tendinopathy, being utilized as either a standalone or adjunct treatment in both conservative and surgical approaches [10]. In recent years, PRP has become one of the most frequently employed injectable biologics in the field of sports medicine. PRP, which is replete with a high concentration of platelets and a plethora of growth factors such as Platelet-Derived Growth Factor (PDGF), Vascular Endothelial Growth Factor (VEGF), and Fibroblast Growth Factor (FGF), creates a microenvironment that is highly conducive to cell growth and proliferation [11]. Existing research findings have demonstrated that cytokines can ameliorate tendon healing by modulating inflammation, promoting angiogenesis, facilitating cell migration and proliferation, as well as stimulating the synthesis of the extracellular matrix [11]. PRP being an autologous blood product, does not trigger immune rejection reactions. The small number of white blood cells it contains can be distributed on the synovial surface, thereby alleviating inflammatory responses and exhibiting a certain degree of anti-infective effect [12]. Over the past few years, PRP injection therapy has accelerated the healing of injured tendons, ligaments, muscles, and joints. However, the evidence of its therapeutic efficacy varies considerably across specific indications.

Recently, numerous randomized controlled trials (RCTs) have evaluated the application of PRP in orthopedics, particularly concerning tendon and ligament injuries. Several clinical trials have been conducted to explore the relationship between CS and PRP in the treatment of tendinopathy; however, there is still no consensus on which method should be the preferred treatment for tendinopathy. The effectiveness of tendinopathy treatments continues to be a contentious issue in the medical community [13–16]. This study presents a meta-analysis to compare the clinical efficacy of PRP and CS injections, thereby offering evidence-based guidance for the selection of tendinopathy treatment modalities.

Materials and methods

This systematic review was conducted according to recommended PRISMA checklist guidelines [17]. The protocol is registered on PROSPERO (registration number CRD42024600129). The objective of this protocol is to assess the utility of PRP injections within non-surgical orthopedic interventions.

Inclusion and exclusion criteria Inclusion criteria

(1) Type of study: Published RCT study. (2) Research subjects: Individuals with a clear diagnosis of tendinopathy, regardless of age, gender or nationality. (3) Intervention: Administration of intra-articular injection of PRP to the test group and intra-articular injection of corticosteroid to the control group. (4) At least one of the following outcome indicators: VAS, DASH, AOFAS, WORC. (5) No application of language exclusions.

Exclusion criteria

(1) Duplicate publications or studies with similar data. (2) Reviews, meeting, abstracts, meta, case reports. (3) The experimental group received other therapeutic interventions. (4) Incomplete, unclear, or obviously erroneous data that could not be resolved by contacting the authors.

Search strategy

We conducted a comprehensive literature search across PUBMED, EMBASE, Cochrane, SCOPUS, and Web of Science databases up to September 30, 2024, employing a search strategy that incorporated Medical Subject Headings (MeSH) terms and keywords. To enhance the

search's specificity and sensitivity, we utilized the following MeSH terms and keyword combinations: "Corticosteroid", "Steroid", "Steroids", "Hormones", "Hormone", "Hormone Receptor Agonists", "Hormone Receptor", "Agonists", "Receptor Agonists", "Platelet Rich Plasma", "Plasma", "Platelet-Rich", "platelet-rich plasma", "Ten-"Tendinopathies", "Tendonopath", dinopathy", "Tendonopathies", "Tendinitis", "Tendinitides", "Tendinosis", "Tendinosis", "Tendinoses", "Tendonosis", "Tendonoses", "Achilles tendinopathy", "plantar fasciitis", "lateral epicondylitis", "tennis elbow", "patellar tendinopathy", "carpal tunnel syndrome", "rotator cuff tendinopathy". Using the same selection criteria mentioned above, we manually searched the reference lists of review articles and included studies to identify other potentially eligible studies. Articles published in peer-reviewed journals before September 2024 were searched. Due to limited data sources, only papers published in English were considered. The same search was performed on other databases. Detailed search materials will be provided in the supplementary materials.

Data extraction

For each RCT included in the systematic review, two reviewers (YY and QL) extracted the following data independently: first author, year of publication, study design, participant characteristics (sample size, age, gender), outcome measures, follow-up duration, and primary results. In the context of this review, the assessment of PRP or CS in orthopedic surgery or postoperative settings was excluded, and we focused on four disease groups: 1. Rotator cuff injuries; 2. Lateral epicondylitis; 3. Plantar fasciitis; 4. Tenosynovitis. Any discrepancies in the crosschecking procedure were resolved through a consensus discussion or, otherwise, arbitrated by a third researcher (KGY).

Risk of bias assessment

Using the Cochrane collaboration tool (Cochrane Handbook for Systematic Review of Interventions) to assess the methodological quality of each included study [18]. The tool assesses studies across several criteria: A) sequence generation, B) allocation concealment, C) participant blinding, D) completeness of outcome data (including attrition), E) selective reporting, and F) other potential biases. For each criterion, the procedures conducted in each study were described based on the information collected, and were rated as "high", "low" or "unclear" risk of bias. Two reviewers independently evaluated the included studies against these criteria and resolved any discrepancies through discussion until consensus was achieved.

Statistical analysis

The selected observational outcomes from the literature were assessed using Review Manager 5.4 software. For continuous variables, this review employed the Mean Difference (MD), and for binary outcomes-including adverse events and patient satisfaction-a 95% confidence interval was applied alongside the MD. When the units of the original outcome measures were not consistent, the Standardized Mean Difference (SMD) was used in place of the MD. For continuous outcomes, the scores were reported as means and standard deviations (SD), with a *p*-value less than 0.05 indicating statistical significance. The heterogeneity assessment utilized the I2 statistic, with an I2 value above 50% suggesting high heterogeneity, warranting the use of a random effects model. Conversely, when the I^2 statistic is less than 50%, it suggests low heterogeneity, and a fixed effects model should be employed.

Outcomes

The evaluation of the study outcomes primarily focuses on pain, functional assessments, efficacy rates, and adverse events. Pain levels were evaluated using a VAS, ranging from 0 (no pain) to 10 (most severe pain). The functional assessment tools include: 1. The DASH questionnaire, used for evaluating functional limitations in conditions like rotator cuff injuries and lateral epicondylitis, with higher scores indicating greater functional impairment; 2. The AOFAS, used to assess the severity of plantar fasciitis, where higher scores suggest less severe symptoms; 3. The WORC, scored from 0 (worst quality of life) to 100 (best quality of life). Lastly, the efficacy of the two treatment modalities and the incidence of serious adverse events (e.g., injection site infections and inflammatory reactions) were also assessed. The short-term therapeutic effect assessment time is within 3 months after treatment, the mediumterm therapeutic effect is from 3 to 6 months after treatment, and the long-term therapeutic effect is more than 6 months after treatment.

Results

After cross-referencing five databases, a total of 1159 articles were obtained; among these, 316 articles were excluded due to duplication. After reviewing the titles and abstracts, 761 articles were deemed not to meet the inclusion criteria and were excluded. A full-text review was conducted on the remaining 82 articles, resulting in the exclusion of 55 articles that did not meet the selection standards. The reasons for exclusion included non-RCT studies (n=23), meta-analyses and review articles (n=13), studies using surgery as a control

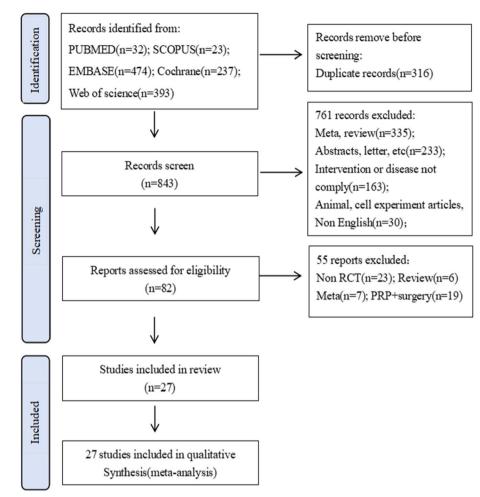


Fig. 1 Flow chart

group (n = 19). Ultimately, 27 articles were included in this study, as illustrated in Fig. 1.

Characteristics of selected studies

In this systematic review, a total of 27 studies were included [1, 2, 8, 13–16, 19–38], with 8 studies concentrating on rotator cuff injuries, 7 on lateral epicondylitis, 10 on plantar fasciitis, 2 on tenosynovitis. The experimental and control groups collectively included 992 patients across all studies, which featured small sample sizes ranging from 15 to 60 cases. The commonly reported outcomes encompassed pain and functional assessments. For assessing pain, the VAS was the predominant method. The functional measurements reported included both specific assessments for tendon pathologies and general scales (DASH for lateral epicondylitis and Tenosynovitis; ROM, WORC, ASES for shoulder cuff injuries; FFI, AOFAS for Plantar fasciitis). Of the 30 trials, 11 documented cure rates, and 4 trial reported

on the incidence of adverse events. Characteristics of studies are shown in Table 1.

Risk of bias

In the assessment of bias risk across 27 studies, 6 demonstrated a high risk of bias in at least one domain, whereas 26 studies indicated an unclear risk of bias in at least one area. Predominantly, studies were rated with an "unclear risk of bias" attributable to the inadequate reporting of allocation concealment. The majority of studies omitted details on blinding, resulting in the classification of blinding as "unclear risk of bias" for most. Two studies failed to report data for each primary outcome, potentially due to loss to follow-up or patient withdrawal, and were consequently rated as having a "high risk of bias" The remaining studies provided data for the primary outcomes, leading to a "low risk of bias" classification for attrition. In these 27 RCTs, no additional risks were identified, and thus, all were rated as having a low risk of bias. The bias risk assessment is depicted in Figs. 2 and 3.

Table 1 Characterist	Characteristics and main results of the included studies on the use of PRP, CS for tendinopathies	he included s	studies o	n the (ISE OT	ΓΧΤ, C	S for ten	dinopathies			
Study (year) ref	Age(year)		Gender(M/F)	r(M/F)	Sam size	Sample size	Study design	Disease	Outcomes	Follow(month)	Main results
	EG	00 CG	B	9	ġ	y					
Shams (2016) [8]	52±12	50±10	10/10	11/9	20	20	RCT	rotator cuff tears	VAS, ASES, CMS	1.5, 3, 6 month	without statistically significant differences between the two groups
Dadgostar (2016) [13]	57.3±9.8	53.±7.24	5/25	6/22	30	28	RCT	rotator cuff tears	VAS, DASH, WORC, ROM	3 month	PRP and steroid injections are both effective
lbrahim (2018) [16]	46.8±10.6	41.±12.5	6/9	7/8	15	15	RCT	rotator cuff tendinopa- thy	VAS, SDQ, ROM	2 month	Both PRP and corticosteroidinjections were effective in the treat- ment of RCT
Thepsoparn (2021) [21]	51.3±10.3	62.4±10.5	3/12	3/13	15	16	RCT	Supraspina- tus Tears	VAS, OSS	1, 6 month	PRP showed superior benefits over the corticosteroid at 6-month follow-up
Saleem (2022) [26]	55.2±5.2	55.9±4.3	24/6	22/8	30	30	RCT	Rotator Cuff Tendinopa- thy	VAS, ROM	1, 3 month	improvement in pain intensity and range of movements after PRP administration
Hewavithana (2023) [28]	58.27 ± 9.44	55.73±10.57	10/20	7/23	30	30	RCT	shoulder- impinge- mentsyn- drome	VAS, DASH	3, 6, 12, month	PRP was effective in long-term improvement in shoulder abduction
Kumar (2022) [31]	> 18		NR	NR	20	20	RCT	Rotator Cuff Tendinopa- thy	VAS, OSS	1, 3 month	Long-term effect was more in case of PRP group as compared to steroid
Kwong (2021) [32]	49.94±9.70	49.08±9.54	16/31	19/33	8 47	52	RCT	Rotator Cuff Tears	VAS, ASES, WORC	1, 3, 12 month	No sustained benefit of PRP over steroid at 12 months
Gosens (2011) [1]	46.8 ± 8.5	47.3 ±7.8	23/28	23/26	5 51	49	RCT	Lateral epi- condylitis	VAS, DASH	1, 2, 3, 6, 12, 24 month	PRP reduces pain and Increases function significantly
Varshney (2016) [14]	20-60		NR	NR	33	50	RCT	Elbow Epi- condylitis	VAS, MAYO	1, 2, 6 month	Treatment of patients with epicondylitiswith PRP exceeding the effect of corticosteroid
Wahhab (2018) [20]	39.4±11.4 41.9±11.8		17/23	19/21	40	40	RCT	Lateral epi- condylitis	VAS, Grip, tedema	1, 3 month	PRP is suggested to be an effective treatment for lateral epicon- dylitis than corticosteroids
Arik (2014) [29]	4 3.7±7.8	46.7±8.4	11/29	10/30	40	40	RCT	lateral epi- condylitis	VAS, PRTEE, Grip	0.5, 1, 3 month	PRP was more effective than corticosteroid in pain,function, and grip strength
Peerbooms (2010) [33]	47.3±7.6	46.9±8.4	25/26	23/26	51	49	RCT	Lateral epi- condylitis	VAS, DASH	1, 2, 3, 6, 12 month	Treatment of chronic lateral epicondylitis with PRP exceeding the effect of corticosteroid
Gupta (2019) [35]	15-55		21/22	25/12	43	37	RCT	Lateral epi- condylitis	VAS, DASH, MEPS, GSS	1.5, 3, 12 month	patients receiving PRP injections fare better at 3 and 12 months
Yadav (2015) [37]	20-60		10/20	7/23	30	30	RCT	Lateral epi- condylitis	VAS, DASH, MGS	0.5, 1, 3 month	PRP is a superior treatment option for longer duration efficacy
Study (year) ref	Age(year)		Gender(M/F)	r(M/F)	Sam size	Sample size	Study design	Disease	Outcomes	Follow(month)	Main results
	EG	CG	EG	CG	EG	9					

Table 1 Characteristics and main results of the included studies on the use of PRP, CS for tendinopathies

Jain 37.7+10.3		7 10	11/6	70	07		plantar fasciitis	AOFAS	3, 6, 12, 24 month	for the plantar fascilitis
3) [15]	38.9±9.5	20/20	26/14	40	40	RCT	plantar fasciitis	AOFAS, VAS, FAI	1, 3, 6 month	treatment of plantar fasciitis with steroid or PRP injection was equally effective
Sawan (2023) [18] 46.67 ±6.33	44.4 ± 7.36	9/21	4/26	30	30	RCT	plantar fasciitis	AOFAS, VAS, RM	1, 1.5, 3, 6 month	PRP injection is safer with better analgesia and functional outcome than steroid for plantar fasciitis
Vahdatpour (2015) [19] 45.44 ±7.74	47.12±10.7	4/12	5/11	16	16	RCT	plantar fasciitis	VAS, RM	1, 3, 6 month	The healing effect of PRP may be begun at least 3 months after injection
Khurana 32.57±4.98 (2020) [23]	34.7 ±5.46	34/24	31/29	58	60	RCT	plantar fasciitis	AOFAS, VAS, RM	0.5, 1, 3, 6 month	PRP provides better painrelief and function as compared to ster- oid injection
Kumar (2024) [24] 20–60		NR	NR	30	30	RCT	plantar fasciitis	AOFAS, VAS	0.5, 1, 3, 6 month	PRP are superior to corticosteroid in terms of long-term pain functional
Sharma 42.9±10.3 (2023) [27]	44.7±11.6	6/39	8/37	45	45	RCT	plantar fasciitis	AOFAS, VAS	3, 6 month	The PRP injection showed a better outcome than the steroid injection
Olivo 24–61 (2017) [30]		NR	NR	4	4	RCT	plantar fasciitis	AOFAS, VAS, FADI	0.5, 1, 2, 3, 6 month	PRP demonstrates an efficacy equal to that of steroids
Peerbooms (2019) [34] 50.73 ± 11.33	47.5±11.19	15/48	18/34	63	52	RCT	plantar fasciitis	FFI, AOFAS	1, 3, 6, 12 month	improvement in pain intensity and range of movements after PRP administration
Tabrizi (2019) [3 6] 33.6±8.5	31.7 ±7.5	1/14	1/15	15	16	RCT	plantar fasciitis	FFI, VAS	6 month	injection with corticosteroid was more effective than PRP at reducing pain and improving function
Kumar 35.83±8.48 (2023) [22]	37.8±6.44	8/22	10/20	30	30	RCT	tenosyno- vitis	VAS, DASH, MMWS	1, 3, 6, 12 month	PRP is equally effectiveas corticosteroid
Shoma 45.6±10.4 (2023) [25]	46.9±11.3	12/21	9/22	33	31	RCT	tenosyno- vitis	VAS, MAYO	1, 3, 6 month	PRP provides better functional than corticosteroid in tenosyno- vitis

Shoulder cuff injuries

Eight studies evaluated the reduction in pain associated with shoulder cuff injuries using changes in VAS scores, comparing the efficacy of (PRP and CS treatments. Furthermore, shoulder joint functionality was assessed using questionnaires (DASH, WORC, ASES, OSS). At one month post-treatment, no statistically significant differences were observed in VAS scores between the two groups (5 studies, PRP group: 142 participants; CS group: 146 participants). Nonetheless, at three months post-treatment, the PRP group demonstrated superior improvement in shoulder joint VAS scores compared to the CS group (6 studies, PRP group: 157 participants; CS group: 161 participants; OR=-1.64,95%CI [-2.97,-0.31],P = 0.02; Fig. 4). However, when assessing improvements in shoulder joint function at 1, 3, and 6 months post-treatment with either PRP or CS, no significant differences were noted between the groups (Fig. 4).

Lateral epicondylitis

In assessing the efficacy and safety of PRP versus CS treatments for lateral epicondylitis using VAS and DASH scores, seven studies reveal no significant difference in VAS scores one month post-treatment. Nonetheless, at three months post-treatment, patients in the PRP group exhibited greater improvements in VAS scores than those in the CS group (seven trials, PRP group: 228 patients; CS group: 290 patients; OR = -0.97,95%CI [-1.87,-0.06],P = 0.04; Fig. 5). Data from three clinical trials indicate that the PRP group's VAS score improvements were sustained and superior to the CS group at six months post-treatment (PRP group: 135 patients; CS group: 148 patients; OR=-2.70,95%CI [-4.13,-1.28],*P*=0.0002; Fig. 5). At twelve months, no significant differences in VAS score improvements were observed between the two groups (three trials, PRP group: 145 patients; CS group: 145 patients). Analysis of the DASH scale scores at one month post-treatment shows that the CS group had lower scores, signifying better elbow functionality (four trials, PRP group: 175 patients; CS group: 170 patients). However, at three and twelve months post-treatment (three trials, PRP group: 145 patients; CS group: 145 patients; OR = -0.97,95% CI [-1.87,-0.06],*P* < 0.00001; OR = -18.03,95% CI [-31.61,-4.46],P = 0.009; Fig. 5), the DASH scores for the PRP group were consistently lower than the CS group, suggesting that initial improvements in elbow function were attributed to the CS treatment. This suggests that while the short-term efficacy of PRP for lateral epicondylitis is comparable to CS, but its medium efficacy is superior (Fig. 5).

Plantar fasciitis

Seven studies reported VAS scores for pain and functional scores using the AOFAS and FFI. At 1 and 3 months post-treatment, no significant differences in pain improvement were observed between the PRP and CS groups. Nonetheless, at 6 months post-treatment, the PRP group exhibited superior pain improvement compared to the CS group(OR = -1.41,95%CI [-1.88,-0.44],P < 0.00001; Fig. 6). Analysis of AOFAS scores revealed no significant differences in functional outcomes between the two groups at 1 and 3 months post-treatment. In contrast, the AOFAS scores of the PRP group were significantly higher at 6 months post-treatment, indicating better functional outcomes(OR=7.19,95% CI [2.41,11.91], P=0.003; Fig. 6). These findings suggest that PRP treatment for plantar fasciitis has comparable short-term efficacy to CS, yet shows superior mid-term efficacy. Long-term efficacy comparisons necessitate additional clinical trials for validation (Fig. 6).

Tenosynovitis

Two studies, comprising 63 participants in the PRP group and 61 in the CS group, assessed the effects of PRP and CS treatments on VAS scores for tenosynovitis, along with finger joint function scores using the DASH and MAYO scales. The findings indicated that at one month post-treatment, the VAS scores were lower in the CS group(OR=0.31,95% CI [0.02,0.59],P=0.04; Fig. 7). Nonetheless, at three months post-treatment, no statistically significant differences were observed between the two groups(OR=-1.23,95% CI [-1.23,0.57],P=0.06; Fig. 7). By six months posttreatment, patients in the PRP group exhibited greater pain improvement(OR=-0.72,95% CI [-1.04,-(0.40], P < 0.00001; Fig. 7). The structural scoring results revealed no statistically significant differences between the treatment groups at one, three, and six months posttreatment, suggesting that PRP may provide superior mid- to long-term pain relief compared to CS for tenosynovitis (Fig. 7).

Efficiency and adverse events

No participants reported any serious adverse events (eg.,infections, inflammatory responses, severe pain, etc.) in the follow-up period in either the PRP or CS group. However, most trials did not describe the monitoring process for identifying or recording complications, and typically limited their reports to a single statement indicating the absence of complications. Other less severe short-term adverse events, primarily mild pain

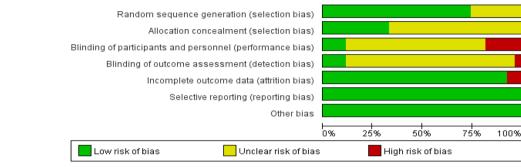


Fig. 2 Risk of bias graph

at the injection site and skin rashes, were recorded and reported in four trials (PRP group: 108 participants, CS group: 107 participants) (OR=0.35,95%CI [0.17, 0.72], P=0.004;Fig. 9). Additionally, we assessed the treatment efficacy recorded in ten articles (PRP group: 413 patients, CS group: 403 patients) and found that the treatment efficacy in the PRP group was higher compared to the CS group (OR=3.09, 95% CI [2.18, 4.39], p<0.00001; Fig. 9). These two results suggest that the efficacy of PRP treatment for tendinopathy may be superior to that of CS, along with a higher safety profile(Fig. 8).

Sensitivity analysis

In this review, we performed sensitivity analyses of the primary.

outcomes by removing Low-quality literature study. The results showed that pooled analysis results were stable for the primary outcomes(Fig. 9).

Publication bias

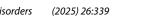
Funnel plots tests were performed only for outcome measures in more than ten studies. The funnel plot for the efficiency was symmetric, as shown in Fig. 10, indicates no significant publication bias.

Discussion

Tendon injuries are generally caused by overuse, leading to a series of pathological manifestations such as lipid deposition, proteoglycan accumulation, a reduction in type I collagen, and severe inflammatory responses [39]. Numerous studies have indicated that hormone injection can rapidly and effectively alleviate pain and improve function; however, the long-term outcomes are poor, and recurrence is common. Prolonged use of hormones can exacerbate local tendon tissue degeneration and necrosis, resulting in muscle atrophy [40]. In recent years, an increasing number of studies and meta-analyses have confirmed that PRP injection therapy can effectively relieve pain in patients with tendinopathy or improve joint function [41]. The advantage of PRP lies in its high concentration of growth factors, which can stimulate angiogenesis and promote tendon cell proliferation, offering significant long-term efficacy. However, there are still certain drawbacks, including a lack of standardized preparation protocols and optimal dosing, as well as relatively high treatment costs [42].

PRP is currently widely used in clinical practice for the treatment of musculoskeletal diseases. Over the past few years, PRP injections have accelerated the recovery of injured ligaments, tendons, muscles, and joints, although the evidence of its therapeutic efficacy is highly variable [16]. For this reason, we compared it with the traditional treatment for tendinopathy, steroid injections, to assess its effectiveness and safety. However, the optimal treatment for tendinopathy remains uncertain.

In this meta-analysis, we included 27 studies that evaluated patients with rotator cuff injuries, lateral epicondylitis, plantar fasciitis, and tenosynovitis. The efficacy of PRP compared to CS varied across different conditions. Notably, in the short term, both treatments showed no significant differences in pain relief or functional improvement, with CS injections demonstrating a more pronounced effect on pain reduction. However, in the medium term, PRP exhibited superior efficacy in alleviating pain.Interestingly, our analysis of data regarding rotator cuff injuries, and tendinitis, revealed that although PRP showed a significant advantage over the control group in mid-term pain outcomes, this benefit did not extend to functional score. The metaanalysis results demonstrate that at three months posttreatment for patients with rotator cuff injuries, and at six months for those with tenosynovitis, the VAS scores in the PRP group exhibited significant improvements over the control group. However, across all time points assessed, no significant differences were observed in the DASH, WORC, and MAYO scores between the PRP and CS groups. This could be attributed to the subjective nature of many questions within the questionnaires. For



as)

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bia	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Arik 2014	•	?	?	?	•	•	•
Dadgostar 2021	•	?	?	?	•	•	•
Gosens 2011	?	?	?	?	•	•	•
Gupta 2019	•	?	?	?	•	•	•
Hewavithana 2023	•	•	•	?	•	•	•
Ibrahim 2018	?	?	?	?	•	•	•
Jain 2018	•	•	?	?	•	•	•
Khurana 2020	•	•	?	?	•	•	•
Kumar 2022	?	?	•		•	•	•
Kumar 2023	•	?	?	?	•	•	•
Kumar 2024	•	•	•	?	•	•	•
Kwong 2021	•	•	•	•	•	•	•
Monto 2014	?	?	?	?	•	•	•
Olivo 2017	•	•	•	•	•	•	•
Peerbooms 2010	•	•	?	?	•	•	•
Peerbooms 2019	•	•	?	?	•	•	•
SALEEM 2022	?	?	?	?	•	•	•
Sawan 2023	•	?	?	?	•	•	•
Shams 2016	•	?	?	?		•	•
Sharma 2023	•	•	•	?		•	•
Shoma 2023	•	?	?	?	•	•	•
Tabrizi 2019	•	?	?	?	•	•	•
Thepsoparn 2021	•	?		?	•	•	•
Vahdatpour 2015	•	?		•	•	•	•
Varshney 2016	•	?	?	?	•	•	•
Wahhab 2018	?	?	?	?	•	•	•
Yadav 2015	?	?	?	?	•	•	•
Fin D Diele of biog of the							

Fig. 3 Risk of bias summary

instance, the DASH questionnaire comprises five items on shoulder symptoms and twenty-five on functional tasks [43, 44]. It evaluates a range of shoulder function domains, including work-related activities, recreational activities, and emotional responses to symptoms. The discrepancies observed in this meta-analysis may relate to the diversity of shoulder function components assessed by each questionnaire, varying between unidimensional and multidimensional constructs. Moreover, questionnaires differ in its reliability and validity that ranges from good to excellent.Meanwhile, in early-stage rotator cuff injury, patients often cannot move their shoulder joints due to pain. This can lead to extensive adhesions in the soft tissues around the joint, muscle spasms, and contractures of ligaments and the joint capsule, thereby impairing joint function. Both PRP and CS joint perfusion therapies can effectively alleviate pain in the short term. However, improving shoulder joint function requires not only repairing damaged tendons and soft tissues in the rotator cuff but also functional exercise. Functional exercise can relieve adhesions in the ligaments and tendons around the joint, thus improving joint dysfunction. Consequently, the recovery of shoulder function often lags behind the improvement of pain symptoms. This study needs a longer follow-up period to explore the relationship between rotator cuff function recovery and pain improvement after PRP joint injection. This will provide more evidence for tendon injury treatment. The analysis of results for lateral epicondylitis and plantar fasciitis reveals a significant correlation between pain improvement and enhancement of functional scores. The meta-analysis results indicate that patients with lateral epicondylitis experienced greater improvements in pain and DASH scores after three months of PRP treatment compared to the control group. Similarly, patients with plantar fasciitis demonstrated superior pain relief and AOFAS score improvements six months post-PRP treatment, suggesting a significant correlation.

Lateral epicondylitis and plantar fasciitis typically result from overuse and strain, causing tendon degeneration and muscle origin degeneration [45, 46]. This degenerative process subsequently prompts the release of aseptic inflammation, manifesting as pain and functional impairment [47]. Rotator cuff injuries often stem from repetitive strain, leading to tears in the supraspinatus and infraspinatus muscles at their attachment points within the rotator cuff, thereby causing pain and functional limitations [48].

Based on the findings of this meta-analysis, we conclude that PRP injection therapy is effective for improving pain associated with tendinopathy and exhibits superior mid-term efficacy compared to CS. Moreover, in conditions characterized by aseptic inflammation, pain induction, or associated functional impairments, PRP shows superior therapeutic outcomes over CS. This superiority can be attributed to the release of macrophages

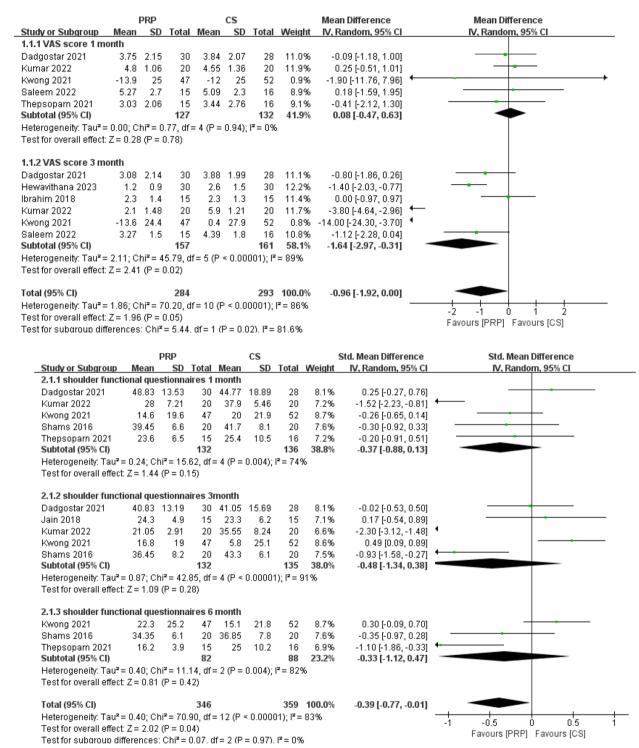


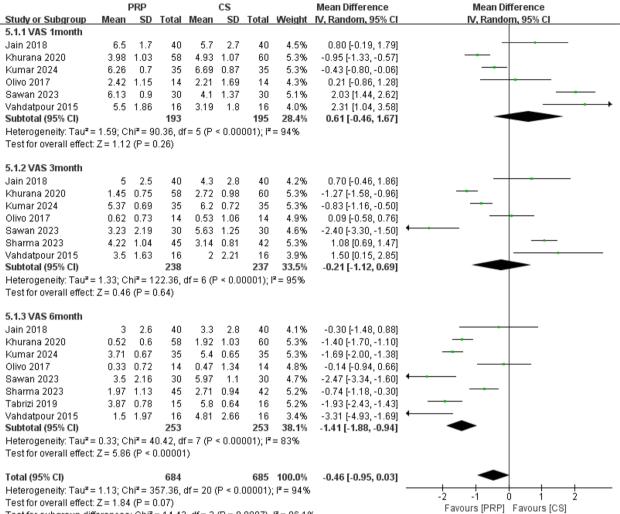
Fig. 4 Forest plot. Rotator cuff tendinopathy. Outcomes: visual analog scale score for pain, and shoulder functional questionnaires. PRP: platelet-rich plasma; CS: corticosteroid; SD: standard deviation; 95% CI: 95% confidence interval

and growth factors upon PRP activation, facilitating the clearance of necrotic tissue and dampening inflammatory responses. However, in cases of functional impairments resulting from muscle, tendon injuries, or nerve compression, there is no significant statistical difference observed between PRP and CS. The impact of PRP on tendon

	I	PRP			CS			Mean Difference	Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% Cl	IV, Random, 95% Cl
3.1.1 VAS 1month									
Arik 2014	3.6	1.2	40	2.5	1.1	40	5.7%	1.10 [0.60, 1.60]	+
Gosens 2011	5.57	2.41	51	4.43	2.63	49	5.4%	1.14 [0.15, 2.13]	
Gupta 2019	44.5	17.3	43	13.8	19.7	37	0.9%	30.70 [22.51, 38.89]	· · · · · ·
Peerbooms 2010	5.54	2.42	51	4.42		49	5.4%	1.12 [0.13, 2.11]	⊢ ⊷−
Varshney 2016	2.45	0.9	33	2.34	1.18	50	5.7%	0.11 [-0.34, 0.56]	+
Nahhab 2018	4.9	0.9	40	6.3	0.9	40	5.7%	-1.40 [-1.79, -1.01]	+
Yadav 2015	4.6	0.9	30	3.4	1.1	25	5.7%	1.20 [0.66, 1.74]	-
Subtotal (95% CI)	4.0	0.5	288	0.4	1.1	290	34.4%	1.13 [-0.10, 2.35]	•
Heterogeneity: Tau ² =	2.20.0	bi z = 1.		₩ = 6 /E	~ 0.01			1.15 [-0.10, 2.55]	-
Test for overall effect:				л — О (F	< 0.0	5001),1	- 90%		
3.1.2 VAS 3month									
Arik 2014	2.1	1.1	40	3.7	1.9	40	5.6%	-1.60 [-2.28, -0.92]	
Gosens 2011	4.77	2.5	51	4.34		49	5.3%	0.43 [-0.63, 1.49]	
Supta 2019	4	2.9	43	22.7	22.3	37		-18.70 [-25.94, -11.46]	•
Peerbooms 2010	4.29	2.92	51	4.69	2.49	49	5.3%	-0.40 [-1.46, 0.66]	-+-
arshney 2016	1.57	0.9	33		0.77	50	5.7%	0.21 [-0.16, 0.58]	+
Vahhab 2018	3.5	0.3	40	5	0.8	40	5.7%	• • •	+
								-1.50 [-1.90, -1.10]	-
adav 2015	1.6	0.9	30 288	2.8	1.1	25	5.7%	-1.20 [-1.74, -0.66]	
Subtotal (95% CI)	4 4 7. 0	L:2 - 7				290	34.4%	-0.97 [-1.87, -0.06]	~
leterogeneity: Tau² = est for overall effect:				= 6 (Р ·	< 0.001	JU1); F	= 92%		
3.1.3 VAS 6month									
Gosens 2011	3 79	3.08	51	5.58	2.41	49	5.3%	-2.29 [-3.37, -1.21]	
Supta 2019		3.15	51		2.32	49	5.3%	-1.74 [-2.82, -0.66]	
arshney 2016		1.57	33		1.46	49	5.6%	-3.92 [-4.59, -3.25]	- -
Subtotal (95% CI)	0.09	1.97	135	4.01	1.40	148	16.2%	-3.92 [-4.59, -3.25]	•
Heterogeneity: Tau ² =	1 25:0	hi z _ 1 *		- 2/0.	- 0 00			-2.70 [-4.13, -1.20]	•
Fest for overall effect:				- 2 (F -	- 0.00	19), 1 -	00%		
.1.4 VAS 12month									
Gosens 2011	2.59	3.06	51	4.88	2.7	49	5.2%	-2.29 [-3.42, -1.16]	
Supta 2019	2.5	5.5	43	13.5		47	4.6%	-11.00 [-12.73, -9.27]	←
eerbooms 2010		3.12	51	2.01		49	5.2%	0.52 [-0.64, 1.68]	- -
0010001110 2010									
Subtotal (95% CI)			145			145	15.1%		
Subtotal (95% Cl) Heterogeneity: Tau ² = Test for overall effect:			118.78,	df= 2 ((P < 0.1	145	15.1%	-4.22 [-10.03, 1.59]	
Heterogeneity: Tau² =			118.78,	df= 2 ((P < 0.1	145 00001);	15.1%		•
Heterogeneity: Tau ² = Test for overall effect:	Z=1.42	? (P = 0	118.78, 1.15) 856			145 00001); 873	15.1% I ² = 98% 100.0%	-4.22 [-10.03, 1.59]	
Heterogeneity: Tau ² = Test for overall effect: Fotal (95% CI) Heterogeneity: Tau ² = Test for overall effect:	Z = 1.42 3.08; C Z = 2.41	? (P = 0 hi ² = 5: (P = 0	118.78, 1.15) 856 29.10, (1.02)	df= 19 ((P < 0.1	145 00001); 873 00001);	15.1% ² = 98% 100.0% ² = 96%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19]	-10 -5 0 5 10 Favours [PRP] Favours [CS]
Heterogeneity: Tau² = Test for overall effect: Total (95% CI)	Z = 1.42 3.08; C Z = 2.41 erences	? (P = 0 hi ² = 5) l (P = 0 s: Chi ² :	118.78, 1.15) 856 29.10, (1.02)	df= 19 ((P < 0.1 (P = 0.	145 00001); 873 00001);	15.1% ² = 98% 100.0% ² = 96%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19]	Favours [PRP] Favours [CS]
Heterogeneity: Tau ² = Fest for overall effect: Fotal (95% Cl) Heterogeneity: Tau ² = Fest for overall effect: Fest for subdroup diff	Z = 1.42 3.08; Cl Z = 2.41 erences	? (P = 0 hi ² = 5; l (P = 0 :: Chi ² : PRP	118.78, 1.15) 856 29.10, (1.02) = 17.73	df=19 (. df=3	(P < 0.1 (P = 0. CS	145 00001); 873 00001); 0005).	15.1% ² = 98% 100.0% ² = 96% ² = 83.1%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = Test for overall effect: Fotal (95% Cl) Heterogeneity: Tau ² = Test for overall effect: Test for subdroup diff Study or Subdroup	Z = 1.42 3.08; Cl Z = 2.41 erences	? (P = 0 hi ² = 5; l (P = 0 :: Chi ² : PRP	118.78, 1.15) 856 29.10, (1.02) = 17.73	df=19 (. df=3	(P < 0.1 (P = 0. CS	145 00001); 873 00001); 0005).	15.1% ² = 98% 100.0% ² = 96%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19]	Favours [PRP] Favours [CS]
Heterogeneity: Tau ² = Fest for overall effect: Total (95% CI) Heterogeneity: Tau ² = Fest for overall effect: Fest for subaroup diff Study or Subgroup L1.1 DASH 1month	Z = 1.42 3.08; Ci Z = 2.41 erences Mean	? (P = 0 hi ^z = 5) l (P = 0 :: Chi ^z : PRP SD	118.78, 1.15) 856 29.10, c 1.02) = 17.73 <u>Total</u>	df= 19 (. df= 3 <u>Mean</u>	(P < 0.1 (P = 0. CS SD	145 00001); 873 00001); 0005).	15.1% ² = 98% 100.0% ² = 96% ² = 83.1% Weight	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference <u>IV, Random, 95% Cl</u>	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = Test for overall effect: Total (95% CI) Heterogeneity: Tau ² = Test for overall effect: Test for subarroup diff Study or Subarroup diff	Z = 1.42 3.08; Ci Z = 2.41 erences Mean	? (P = 0 hi ² = 5; l (P = 0 :: Chi ² : PRP	118.78, 1.15) 856 29.10, (1.02) = 17.73	df= 19 (. df= 3 <u>Mean</u>	(P < 0.1 (P = 0. CS	145 00001); 873 00001); 0005). <u>Total</u>	15.1% ² = 98% 100.0% ² = 96% ² = 83.1%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = Test for overall effect: Total (95% CI) Heterogeneity: Tau ² = Test for overall effect: Test for subaroup diff Study or Subgroup 1.1 DASH 1month Sogens 2011 Sogens 2011	Z = 1.42 3.08; C Z = 2.41 erences <u>Mean</u> 43.1 64.15	? (P = 0 hi ² = 5) l (P = 0 :: Chi ² = PRP SD 21.6	118.78, 1.15) 856 29.10, o 1.02) = 17.73 <u>Total</u> 51	df = 19 (df = 3 <u>Mean</u> 31.2 53.25	(P < 0.1 (P = 0. CS SD 20.8	145 00001); 873 00001); 0005). <u>Total</u> 49	15.1% ² = 98% ² = 98% ² = 96% ² = 83.1% <u>Weight</u> 10.1%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV, Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = Test for overall effect. Total (95% CI) Heterogeneity: Tau ² = Test for overall effect. Test for subaroup diff Study or Subgroup 1.1 DASH 1month Josens 2011 Jupta 2019 2010	Z = 1.42 3.08; C Z = 2.41 erences Mean 43.1 64.15 135.9	2 (P = 0 hi ² = 5) (P = 0 :: Chi ² = PRP <u>SD</u> 21.6 2.91 78	118.78, (.15) 856 29.10, ((.02) = 17.73 <u>Total</u> 51 43 51	df = 19 (. df = 3 <u>Mean</u> 31.2 53.25 97.4	(P < 0.1 (P = 0. CS 20.8 2.85 69	145 00001); 873 00001); 00005). Total 49 47 49	15.1% ² = 98% ² = 96% ² = 83.1% Weight 10.1% 11.3% 4.6%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau [≈] = 'est for overall effect: 'otal (95% CI) Heterogeneity: Tau [∞] = 'est for subarroup diff <u>study or Subarroup</u> .t.1 DASH Imonth Bosens 2011 Supta 2019 'eerbooms 2010	Z = 1.42 3.08; C Z = 2.41 erences Mean 43.1 64.15 135.9	? (P = 0 hi ² = 5) l (P = 0 :: Chi ² = PRP SD 21.6 2.91	118.78, (.15) 856 29.10, c (.02) = 17.73 <u>Total</u> 51 43 51 30	df = 19 (df = 3 <u>Mean</u> 31.2 53.25	(P < 0.1 (P = 0. CS 20.8 2.85 69	145 00001); 873 00001); 0005). <u>Total</u> 49 47 49 25	15.1% ² = 98% 100.0% ² = 96% ² = 83.1% Weight 10.1% 11.3% 4.6% 11.2%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV, Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = 'est for overall effect.' 'est for overall effect.' 'est for overall effect.' 'est for subaroup diff <u>study or Subgroup</u> .1.1 DASH 1month Josens 2011 Supta 2019 'eerbooms 2010 'adav 2015 Subtotal (95% CI) Heterogeneity: Tau ² =	Z = 1.42 3.08; C Z = 2.41 erences 43.1 64.15 135.9 62.5 1.83; C	<pre>? (P = 0 hi² = 5) (P = 0 : Chi² = PRP SD 21.6 2.91 78 5.78 hi² = 4.</pre>	118.78, 115) 856 29.10, o 102) = 17.73 <u>Total</u> 51 43 51 30 175 42, df=	df = 19 (df = 3 <u>Mean</u> 31.2 53.25 97.4 53.13 : 3 (P =	(P < 0.1 (P = 0. CS 20.8 2.85 69 6.12	145 00001); 873 00001); 0005). <u>Total</u> 49 47 49 25 170	15.1% ² = 98% 100.0% ² = 96% ² = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34]	Favours (PRP) Favours (CS) Mean Difference
eterogeneity: Tau ² = est for overall effect: otal (95% CI) eterogeneity: Tau ² = est for overall effect: est for subaroup diff dudy or <u>Subaroup</u> .1.1 DASH 1month Josens 2011 Bupta 2019 ere/booms 2010 adav 2015 Jubtotal (95% CI) leterogeneity: Tau ² =	Z = 1.42 3.08; C Z = 2.41 erences 43.1 64.15 135.9 62.5 1.83; C	<pre>? (P = 0 hi² = 5) (P = 0 : Chi² = PRP SD 21.6 2.91 78 5.78 hi² = 4.</pre>	118.78, 115) 856 29.10, o 102) = 17.73 <u>Total</u> 51 43 51 30 175 42, df=	df = 19 (df = 3 <u>Mean</u> 31.2 53.25 97.4 53.13 : 3 (P =	(P < 0.1 (P = 0. CS 20.8 2.85 69 6.12	145 00001); 873 00001); 0005). <u>Total</u> 49 47 49 25 170	15.1% ² = 98% 100.0% ² = 96% ² = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV, Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = 'est for overall effect. 'otal (95% CI) Heterogeneity: Tau ² = 'est for overall effect. 'est for subaroup diff <u>study or Subgroup</u> .1.1 DASH 1month Josens 2011 Bupta 2019 Verbooms 2010 'adav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = 'est for overall effect. .1.2 DASH 3month	Z = 1.42 3.08; C Z = 2.41 erences 43.1 64.15 135.9 62.5 1.83; C Z = 9.15	<pre>? (P = 0 hi² = 5: (P = 0 (P = 0) Chi² = 0 Chi² = 0 21.6 2.91 78 5.78 hi² = 4. (P < 0)</pre>	118.78, 1.15) 856 29.10, (1.02) = 17.73 Total 51 43 51 30 175 42, df = 1.00001	df = 19 (df = 3 <u>Mean</u> 31.2 53.25 97.4 53.13 3 (P =)	(P < 0.1 (P = 0. CS 20.8 2.85 69 6.12 0.22);	145 00001); 873 00001); 0005). <u>Total</u> 49 47 49 25 170 ² = 329	15.1% P = 98% 100.0% P = 96% P = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3% %	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV, Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau [≈] = est for overall effect: 'otal (95% CI) Heterogeneity: Tau [∞] = est for overall effect: est for overall effect: Audv or Subgroup Audv or Subgroup Audv or Subgroup Audv or Subgroup Heterogeneity: Tau [∞] = est for overall effect: AUDSH 3month Bosens 2011	Z = 1.42 3.08; C Z = 2.41 erences 43.1 64.15 135.9 62.5 1.83; C Z = 9.15 21.3	<pre>? (P = 0 hi² = 5: (P = 0 :: Chi² = PRP</pre>	118.78, 115) 856 29.10, o 102) = 17.73 Total 51 43 51 43 51 30 175 42, df = 1.00001 51	af = 19 (df = 3 <u>Mean</u> 31.2 53.25 97.4 53.13 : 3 (P =) 32.3	(P < 0.1 (P = 0. CS 20.8 2.85 69 6.12 0.22); 21.7	145 00001); 873 00001); 0005). <u>Total</u> 49 47 49 25 170 1 ² = 329	15.1% P = 98% 100.0% P = 96% P = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3% %	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference W. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau [#] = est for overall effect: teterogeneity: Tau [#] = est for overall effect: est for subaroup diff tudy or Subgroup .1.1 DASH 1month bosens 2011 bupta 2019 Peerbooms 2010 (adav 2015 bubtotal (95% CI) Heterogeneity: Tau [#] = est for overall effect: .1.2 DASH 3month Bosens 2011 bupta 2019	Z = 1.42 3.08; C $Z = 2.41erences43.164.15135.962.51.83; CZ = 9.1521.335.1$	P(P = 0) P(P = 0) (P = 0)	118.78, 115) 856 29.10, (.02) = 17.73 Total 43 51 43 51 43 51 43 51 43 51 42, df= .00001 51 43 42, df= 43 43 43 42, df= 43 42, df= 43 43 43 44 43 51 44 43 51 44 43 51 44 44 51 51 51 51 51 51 51 51 51 51	af = 19 (df = 3 <u>Mean</u> 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75	P < 0. (P = 0. CS 20.8 2.85 69 6.12 0.22); 21.7 3.09	145 20001); 873 20001); 0005). Total 49 47 170 1 ⁷ = 32 ⁹ 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 49 47 49 49 49 47 49 49 49 47 49 49 47 49 49 49 47 49 49 49 49 49 49 40 40 40 40 40 40 40 40 40 40	15.1% P = 98% 100.0% P = 96% P = 83.1% Weight 10.1% 11.3% 4.1.2% 37.3% %	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.93, -8.37]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = fest for overall effect. rotal (95% CI) Heterogeneity: Tau ² = rest for overall effect. rest for subaroup diff Study or Subgroup L.1.1 DASH 1month Jougha 2019 Peerbooms 2011 Subtotal (95% CI) Heterogeneity: Tau ² = rest for overall effect: L.1.2 DASH 3month Sosens 2011 Supta 2019	Z = 1.42 3.08; C $Z = 2.41erences43.164.15135.962.51.83; CZ = 9.1521.335.1$	<pre>? (P = 0 hi² = 5: (P = 0 :: Chi² = PRP</pre>	118.78, 115) 856 29.10, o 102) = 17.73 Total 51 43 51 43 51 30 175 42, df = 1.00001 51	af = 19 (df = 3 <u>Mean</u> 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75	(P < 0.1 (P = 0. CS 20.8 2.85 69 6.12 0.22); 21.7	145 873 00001); 0005). <u>Total</u> 49 47 49 25 170 1 ² = 329 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 49 47 49 49 47 49 49 47 49 49 47 49 49 49 49 49 49 49 49 49 49	15.1% P = 98% 100.0% P = 96% P = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3% %	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference W. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = (est for overall effect: (otal (95% CI) Heterogeneity: Tau ² = (est for overall effect: (est for subaroup diff (tauty or Subgroup .1.1 DASH 1month Josens 2011 Subto 2015 Subtotal (95% CI) Heterogeneity: Tau ² = (est for overall effect: .1.2 DASH 3month Josens 2011 Supta 2019 Supta 2019 Supta 2019 Supta 2019 Supta 2019 Supta 2019 Supta 2019 Supta 2019 Supta 2019 Supta 2019	Z = 1.42 3.08; C $Z = 2.41erences43.164.15135.962.51.83; CZ = 9.1521.335.1$	P(P = 0) $hi^{2} = 5:$ (P = 0) (P = 0) C = 0 PRP SD 21.6 2.91 78 5.78 $hi^{2} = 4.$ 5(P < 0) 222 3.08 78.8	118.78, 115) 856 29.10, (.02) = 17.73 Total 43 51 43 51 43 51 43 51 43 51 42, df= .00001 51 43 42, df= 43 43 43 42, df= 43 42, df= 43 43 43 44 43 51 44 43 51 44 43 51 44 44 51 51 51 51 51 51 51 51 51 51	af = 19 (df = 3 <u>Mean</u> 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75	P < 0. (P = 0. CS 20.8 2.85 69 6.12 0.22); 21.7 3.09 68.7	145 20001); 873 20001); 0005). Total 49 47 170 1 ⁷ = 32 ⁹ 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 49 47 49 49 49 47 49 49 49 47 49 49 47 49 49 49 47 49 49 49 49 49 49 40 40 40 40 40 40 40 40 40 40	15.1% P = 98% 100.0% P = 96% P = 83.1% Weight 10.1% 11.3% 4.1.2% 37.3% %	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.93, -8.37]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = est for overall effect: total (95% CI) Heterogeneity: Tau ² = est for overall effect: "est for subaroup diff Study or Subgroup .t.1 DASH 1month Bosens 2011 Subtotal (95% CI) Heterogeneity: Tau ² = est for overall effect Subtotal (95% CI) Heterogeneity: Tau ² = est for overall effect Sosens 2011 Supta 2019 Peerbooms 2010 aday 2015	Z = 1.42 3.08; Cl $Z = 2.41erencesMean43.164.15135.962.51.83; ClZ = 9.1521.335.192$	P(P = 0) $hi^{2} = 5:$ (P = 0) (P = 0) C = 0 PRP SD 21.6 2.91 78 5.78 $hi^{2} = 4.$ 5(P < 0) 222 3.08 78.8	118.78, (15) 856 29.10, (0.02) = 17.73 Total 51 43 51 42, df= 0.00001 \$1 43 51 43 51	df = 19 (. df = 3 31.2 53.25 97.4 53.13 : 3 (P =) 32.3 44.75 92.2	P < 0. (P = 0. CS 20.8 2.85 69 6.12 0.22); 21.7 3.09 68.7	145 873 00001); 0005). <u>Total</u> 49 47 49 25 170 1 ² = 329 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 49 47 49 49 47 49 49 47 49 49 47 49 49 49 49 49 49 49 49 49 49	15.1% ⁷ = 98% 100.0% ⁷ = 96% ⁷ = 83.1% Weight 10.1% 11.3% 4.6% 10.1% 11.3% 4.6%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference W. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.93, -8.37] -0.20 [-29.14, 28.74]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = est for overall effect: total (95% CI) Heterogeneity: Tau ² = est for overall effect: est for subaroup diff Study or Subgroup ALDASH Imonth Josens 2011 Jupta 2019 Peerbooms 2010 (adav 2015 Stubtotal (95% CI) Heterogeneity: Tau ² = est for overall effect: AL2 DASH 3month Bosens 2019 Peerbooms 2010 (adav 2015 (adav 2015 (adav 2015 (adav 2015)	Z = 1.42 3.08; C Z = 2.41 erences 43.1 64.15 135.9 62.5 1.83; C Z = 9.15 21.3 35.1 92 34.16	$P(P = 0)$ $hi^{2} = 5i;$ $(P = 0)$ $(P = 0)$ $(P = 0)$ $(P = 0)$ PRP PRP 21.6 2.91 78 5.78 $hi^{2} = 4,$ $5(P < 0)$ 222 3.08 78.8 4.32	118.78, 115) 856 29.10, c 0.02) = 17.73 Total 130 175 42, df= .00001 41 43 51 30 175 42, df= .00001 1 30 175 42, df= .00001 1 30 175 1 43 51 30 175 1 42, df= .00001 1 43 51 30 175 1 42, df= .00001 1 1 1 1 1 1 1 1	df = 19 (. df = 3 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75 92.2 44.33	P < 0. (P = 0. CS 20.8 6.12 0.22); 21.7 3.09 68.7 5.22	145 00001); 873 00001); 00005). <u>Total</u> 49 49 25 170 (F = 329 49 47 49 47 49 25 170	15.1% P = 98% 100.0% P = 96% P = 83.1% Weight 10.1% 11.2% 37.3% % 10.1% 11.2% 37.3%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.68, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.33, -8.37] -0.20 [-29.14, 28.74] -10.17 [-12.73, -7.61]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = (est for overall effect: (otal (95% CI) Heterogeneity: Tau ² = (est for overall effect: (est for subaroup diff (tauty or Subgroup .1.1 DASH 1month Dosens 2011 Bupta 2019 Verbooms 2010 (adav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = (est for overall effect: .1.2 DASH 3month Dosens 2011 Bupta 2019 Verbooms 2010 (adav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = (est for overall effect: .1.2 Heterogeneity: Tau ² = (est for overall effect: (adav 2015 Subtotal (95% CI) Heterogeneity: Tau ² =	Z = 1.42 3.08; C Z = 2.41 erences 43.1 64.15 135.9 62.5 1.83; C Z = 9.15 21.3 35.1 92 34.16 0.00; C	P(P = 0) $hi^{z} = 5:$ (P = 0) (P = 0) 21.6 2.91 78 5.78 $hi^{z} = 4.$ 6 (P < 0) 222 3.08 4.32 $hi^{z} = 0.$	118.78, (15) 856 (29.10, ((02) = 17.73 Total (1, 7, 73 Total (1, 7, 73 (1, 7, 73) (1, 7, 73)	ff = 19 (df = 3 <u>Mean</u> 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75 92.2 44.33 3 (P =	P < 0. (P = 0. CS 20.8 6.12 0.22); 21.7 3.09 68.7 5.22	145 00001); 873 00001); 00005). <u>Total</u> 49 49 25 170 (F = 329 49 47 49 47 49 25 170	15.1% P = 98% 100.0% P = 96% P = 83.1% Weight 10.1% 11.2% 37.3% % 10.1% 11.2% 37.3%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.68, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.33, -8.37] -0.20 [-29.14, 28.74] -10.17 [-12.73, -7.61]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = (est for overall effect: (otal (95% CI) Heterogeneity: Tau ² = (est for overall effect: (est for subaroup diff (tauty or Subgroup .1.1 DASH 1month Dosens 2011 Bupta 2019 Verbooms 2010 (adav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = (est for overall effect: .1.2 DASH 3month Dosens 2011 Bupta 2019 Verbooms 2010 (adav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = (est for overall effect: .1.3 DASH 12month	Z = 1.42 3.08; C Z = 2.41 X = 2.44 Mean 43.1 64.15 135.9 62.5 1.83; C Z = 9.15 21.3 34.16 0.00; C Z = 16.9	(P = 0) (P < 0)	118.78, (.15) 856 29.10, (0.02) = 17.73 Total 43 51 43 51 43 51 43 51 43 51 43 61, 175 542, df= 0.00001	fr = 19 (dr = 3 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75 92.2 44.33 3 (P = 1)	(P < 0. (P = 0. CS 50 6.12 0.22); 21.7 3.09 6.8.7 5.22 0.89);	145 00001); 873 00001); 00005). <u>Total</u> 49 49 25 170 (F = 329 49 47 49 47 49 25 170	15.1% ₽ = 98% 100.0% ₽ = 96% ₽ = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3% 4.6% 11.2% 37.3%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV, Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.33, -8.37] -0.20 [-21.4, 28.74] -10.17 [-12.73, -7.61] -9.76 [-10.89, -8.63]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = (est for overall effect: (otal (95% CI) Heterogeneity: Tau ² = (est for overall effect: (est for subaroup diff (tauty or Subgroup .1.1 DASH 1month Dosens 2011 Bupta 2019 Verbooms 2010 (adav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = (est for overall effect: .1.2 DASH 3month Dosens 2011 Bupta 2019 Verbooms 2010 (adav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = (est for overall effect: .1.3 DASH 12month	Z = 1.42 3.08; C Z = 2.41 X = 2.44 Mean 43.1 64.15 135.9 62.5 1.83; C Z = 9.15 21.3 34.16 0.00; C Z = 16.9	P(P = 0) $hi^{z} = 5:$ (P = 0) (P = 0) PRP SD 21.6 2.91 78 5.78 $hi^{z} = 4.$ 6 (P < 0) 22 3.08 4.32 $hi^{z} = 0.$	118.78, (15) 856 (29.10, ((02) = 17.73 Total (1, 7, 73 Total (1, 7, 73 (1, 7, 73) (1, 7, 73)	ff = 19 (df = 3 <u>Mean</u> 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75 92.2 44.33 3 (P =	P < 0. (P = 0. CS 20.8 6.12 0.22); 21.7 3.09 68.7 5.22	145 00001); 873 00001); 00005). <u>Total</u> 49 49 25 170 (^P = 329 49 47 49 47 49 25 170 (^P = 329 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 49 47 49 49 49 47 49 49 49 49 49 49 49 49 49 49	15.1% P = 98% 100.0% P = 96% P = 83.1% Weight 10.1% 11.2% 37.3% % 10.1% 11.2% 37.3%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.60 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.39, -8.37] -0.00 [-29.14, 28.74] -10.17 [-12.73, -7.61] -9.76 [-10.89, -8.63] -16.80 [-26.11, -7.48]	Favours (PRP) Favours (CS) Mean Difference
Heterogeneity: Tau ² = Fest for overall effect: Total (95% CI) Heterogeneity: Tau ² = Fest for overall effect: Fest for subaroup diff Study or Subgroup L.1.DASH 1month Josens 2011 Supta 2019 Peerbooms 2010 (aday 2015 Subtotal (95% CI) Heterogeneity: Tau ² = Fest for overall effect: L.1.2 DASH 3month Josens 2011 Subtotal (95% CI) Heterogeneity: Tau ² = Fest for overall effect: L.1.3 DASH 12month Josens 2011 Subtotal (95% CI) Heterogeneity: Tau ² = Fest for overall effect: L.1.3 DASH 12month Josens 2011 Supta 2019	Z = 1.42 3.08; C Z = 2.41 X = 2.44 Mean 43.1 64.15 135.9 62.5 1.83; C Z = 9.15 21.3 34.16 0.00; C Z = 16.9	(P = 0) P = 5: (P = 0) (P = 0)	118.78, (.15) 856 29.10, (0.02) = 17.73 Total 43 51 43 51 43 51 43 51 43 51 43 61, 175 542, df= 0.00001	fr = 19 (dr = 3 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75 92.2 44.33 3 (P = 1)	P < 0. (P = 0. CS SD 20.8 6.9 6.12 0.22); 21.7 3.09 68.7 5.22 0.89); 24	145 20001); 873 20001); 0005). Total 49 47 49 25 170 17 49 27 170 17 = 32° 170 17 = 0%	15.1% ² = 98% 100.0% ² = 98% ² = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3% 9.9% 11.2%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference W. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.14, 28.74] -0.20 [-29.14, 28.74] -10.17 [-12.73, -7.61] -9.76 [-10.89, -8.63] -16.80 [-26.11, -7.49] -8.45 [-11.02, -5.88]	Favours (PRP) Favours (CS)
Heterogeneity: Tau ² = Fest for overall effect: Total (95% CI) Heterogeneity: Tau ² = Fest for overall effect: Test for subaroup diff Study or Subbaroup 4.1.1DASH 1month Gosens 2011 Supta 2019 Peerbooms 2010 Yadav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 4.1.2DASH 3month Gosens 2011 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 4.1.3DASH 12month Gosens 2011 Supta 2019 Sosens 2011 Supta 2019	Z = 1.42 3.08; C Z Z = 2.41 Mean 43.1 64.15 135.9 62.5 1.83; C Z = 9.15 21.3 35.1 92 34.16 0.00; C Z = 16.9 20 31.65	(P = 0) P = 5: (P = 0) (P = 0)	118.78, 118.78, 115) 856 29.10, c 29.10, c 20.10, c 10.02) 177 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 55 55 55 55 55 55 55 55 5	ff = 19 (i df = 3 <u>Mean</u> 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75 92.2 44.33 3 (P = 11) 36.8	P < 0. (P = 0. CS 50 20.8 2.85 69 6.12 0.22); 21.7 3.09 68.7 5.22 0.89); 24.803	145 20001); 873 200001); 0005). Total 49 47 49 25 170 [⁷ = 32 ⁹ 49 47 49 25 170 [⁷ = 32 ⁹ 170 170 49 49 25 170 49 49 25 170 49 49 25 170 49 49 25 170 49 49 25 170 49 49 25 170 49 49 25 170 49 49 25 170 49 25 170 170 170 170 170 170 170 170	15.1% ² = 98% 100.0% ² = 98% ² = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3% 9.9% 11.2%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference W. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.33, -8.37] -0.20 [-29.14, 28.74] -0.20 [-21.4, 28.74] -0.4, 5.84] -0.20 [-21.4, 28.74] -0.20 [-21.4, 28.74	Favours (PRP) Favours (CS)
Heterogeneity: Tau ² = Fest for overall effect: rotal (95% CI) Heterogeneity: Tau ² = Fest for overall effect: Fest for subaroup diff Study or Subgroup L.1.DASH 1month Bosens 2011 Subtoal (95% CI) Heterogeneity: Tau ² = Fest for overall effect: L.1.2 DASH 3month Bosens 2011 Subtoal (95% CI) Heterogeneity: Tau ² = Fest for overall effect: L.1.3 DASH 12month Bosens 2011 Subtoal (95% CI) Heterogeneity: Tau ² = Fest for overall effect: L.1.3 DASH 12month Bosens 2011 Subtoal (95% CI) Heterogeneity: Tau ² = Fest for overall effect: L.1.3 DASH 12month Bosens 2011 Subtoal (95% CI) Heterogeneity: Tau ² = Fest for overall effect: L.1.3 DASH 12month Bosens 2011 Patha 2019 Patha 2019	Z = 1.42 3.08; C Z Z = 2.41 Mean 43.1 64.15 135.9 62.5 1.83; C Z = 9.15 21.3 35.1 92 34.16 0.00; C Z = 16.9 20 31.65	(P = 0) (P < 0)	118.78, 118.78, 115) 856 29.10, c 29.10, c 20.10, c 10.02) 177 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 43 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 45 51 55 55 55 55 55 55 55 55 5	df = 19 (df = 3 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75 92.2 32.3 3 (P = 1) 36.8 40.1	P < 0. (P = 0. CS 50 20.8 2.85 69 6.12 0.22); 21.7 3.09 68.7 5.22 0.89); 24.803	145 200001); 873 200001); 00005). Total 49 47 49 25 170 170 170 49 47 49 5 170 170 170 49 47 49 47 49 47 49 47 49 47 49 47 7 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 47 49 49 47 49 47 49 49 47 49 49 47 49 49 47 49 49 47 49 49 47 49 49 49 47 49 49 49 49 49 49 49 49 49 49	15.1% ² = 98% 100.0% ² = 98% ² = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3% 9.9% 11.2%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference W. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.14, 28.74] -0.20 [-29.14, 28.74] -10.17 [-12.73, -7.61] -9.76 [-10.89, -8.63] -16.80 [-26.11, -7.49] -8.45 [-11.02, -5.88]	Favours (PRP) Favours (CS)
Heterogeneity: Tau ² = Test for overall effect. Total (95% CI) Heterogeneity: Tau ² = Test for overall effect. Test for overall effect. Test for subaroup diff Study or Subbaroup 4.1.1 DASH 1month Gosens 2011 Gupta 2019 Peerbooms 2010 Yadav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect. 4.1.2 DASH 3month Gosens 2011 Gupta 2019 Peerbooms 2010 Yadav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect. 4.1.3 DASH 12month Gosens 2011 Gupta 2019 Peerbooms 2010 Subtotal (95% CI) Heterogeneity: Tau ² =	Z = 1.42 3.08; C Z = 2.41 erences Mean 43.1 64.15 62.5 1.83; C Z = 9.16 21.33 35.1 92 34.16 0.00; C Z = 16.9 20 31.65 54.7	(P = 0) P = 0 (P = 0) (P = 0)	118.78, 118.78, 102, 102) 17.73 102) 17.73 102) 17.73 1.000 175 42, df= .00001 51 43 51 30 175 63, df= 0.0000 175 51 43 51 100 175 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 1	df = 19 (. df = 3 Mean 31.2 53.25 97.4 53.13 3 (P =) 32.3 3 (P =) 34.75 92.2 44.33 3 (P = 11) 36.8 40.1 108.4	P < 0. (P = 0. CS SD 20.8 2.85 69 6.12 0.22); 21.7 3.09 68.7 5.22 0.89); 24 8.03 82.2	145 20001); 873 20001); 0005). Total 49 47 49 25 170 170 170 170 170 170 49 47 49 25 170 170 49 47 49 47 49 47 49 47 49 47 49 25 170 170 170 170 170 170 170 170	15.1% ² = 98% 100.0% ² = 96% ² = 83.1% Weight 10.1% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.2% 37.3% 9.9% 11.2% 4.3% 25.4%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference W. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.33, -8.37] -0.20 [-29.14, 28.74] -0.20 [-21.4, 28.74] -0.4, 5.84] -0.20 [-21.4, 28.74] -0.20 [-21.4, 28.74	Favours (PRP) Favours (CS)
Heterogeneity: Tau ² = Test for overall effect: Total (95% CI) Heterogeneity: Tau ² = Test for overall effect: Test for subaroup diff Study or Subgroup 4.1.1DASH 1month Gosens 2011 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 4.1.2DASH 3month Gosens 2010 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 4.1.3 DASH 2100 Heterogeneity: Tau ² = Test for overall effect: 4.1.3 DASH 2100 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 4.1.3 DASH 2100 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 5.1.2 DASH 2100 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 5.1.2 DASH 2100 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 5.1.2 DASH 2100 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 5.1.2 DASH 2100 Subtotal (95% CI)	Z = 1.42 3.08; C Z = 2.41 erences Mean 43.1 64.15 62.5 1.83; C Z = 9.16 21.33 35.1 92 34.16 0.00; C Z = 16.9 20 31.65 54.7	(P = 0) P = 0 (P = 0) (P = 0)	118.78, 118.78, 115) 856 92.10 , (0.02) 17.73 102 1 1 1 1 1 1 1 1	df = 19 (. df = 3 Mean 31.2 53.25 97.4 53.13 3 (P =) 32.3 3 (P =) 34.75 92.2 44.33 3 (P = 11) 36.8 40.1 108.4	P < 0. (P = 0. CS SD 20.8 2.85 69 6.12 0.22); 21.7 3.09 68.7 5.22 0.89); 24 8.03 82.2	145 20001); 873 20001); 0005). Total 49 47 49 25 170 F = 32 49 47 49 25 170 F = 32 170 F = 0% 49 47 49 47 49 47 49 47 49 47 47 49 47 47 49 47 47 49 47 47 47 47 47 47 47 47 47 47	15.1% 7 = 98% 1000.0% 7 = 96% 7 = 83.1% Weight 10.1% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.2% 37.3% 9.9% 11.2% 4.3% 25.4% = 82%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference IV, Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.650 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.33, -8.37] -0.20 [-29.14, 28.74] -10.17 [12.73, -7.61] -9.76 [-10.89, -8.63] -16.80 [-26.11, -7.49] -8.45 [-11.02, -5.88] -53.70 [-84.25, -23.15] -18.03 [-31.61, -4.46]	Favours (PRP) Favours (CS)
Heterogeneity: Tau ² = Fest for overall effect: Total (95% CI) Heterogeneity: Tau ² = Fest for overall effect: Test for subaroup diff Study or Subgroup 4.1.1DASH 1month Gosens 2011 Supta 2019 Peerbooms 2010 Yadav 2015 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 4.1.2DASH 3month Gosens 2011 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 4.1.3DASH 12month Gosens 2011 Supta 2019 Peerbooms 2010 Supta 2019 Peerbooms 2010 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: 4.1.3DASH 12month Gosens 2011 Supta 2019 Peerbooms 2010 Subtotal (95% CI) Heterogeneity: Tau ² =	Z = 1.42 3.08; C Z = 2.41 erences Mean 43.1 64.15 62.5 1.83; C Z = 9.16 21.33 35.1 92 34.16 0.00; C Z = 16.9 20 31.65 54.7	(P = 0) P = 0 (P = 0) (P = 0)	118.78, 118.78, 102, 102) 17.73 102) 17.73 102) 17.73 1.000 175 42, df= .00001 51 43 51 30 175 63, df= 0.0000 175 51 43 51 100 175 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 11.02, 51 1	df = 19 (. df = 3 Mean 31.2 53.25 97.4 53.13 3 (P =) 32.3 3 (P =) 34.75 92.2 44.33 3 (P = 11) 36.8 40.1 108.4	P < 0. (P = 0. CS SD 20.8 2.85 69 6.12 0.22); 21.7 3.09 68.7 5.22 0.89); 24 8.03 82.2	145 20001); 873 20001); 0005). Total 49 47 49 25 170 F = 32 49 47 49 25 170 F = 32 170 F = 0% 49 47 49 47 49 47 49 47 49 47 47 49 47 47 49 47 47 49 47 47 47 47 47 47 47 47 47 47	15.1% ² = 98% 100.0% ² = 96% ² = 83.1% Weight 10.1% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.3% 4.6% 11.2% 37.3% 9.9% 11.2% 4.3% 25.4%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference W. Random, 95% CI 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.33, -8.37] -0.20 [-29.14, 28.74] -0.20 [-21.4, 28.74] -0.4, 5.84] -0.20 [-21.4, 28.74] -0.20 [-21.4, 28.74	Favours (PRP) Favours (CS)
Heterogeneity: Tau ² = Test for overall effect: Total (95% CI) Heterogeneity: Tau ² = Test for overall effect: Test for subaroup diff Study or Subgroup L1.1 DASH 1month Bosens 2011 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: L1.2 DASH 3month Bosens 2010 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: L1.3 DASH 12month Bosens 2010 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: L1.3 DASH 21month Bosens 2011 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect: Subtotal (95% CI)	Z = 1.42 3.08; C Z = 2.41 erences Mean 4.3.1 64.15 62.5 1.83; C Z = 9.16 21.33 35.1 92 34.16 0.00; C Z = 16.9 21.03 35.1 92 34.16 0.00; C Z = 10.2 1.65 54.7 10.034; Z Z = 2.60	$\begin{array}{l} (P=0)\\ hi^{a}=5;\\ (P=0)\\ (P=0)\\ (P=0)\\ 21.6\\ 2.91\\ 78\\ 5.78\\ 5.78\\ 6.78\\ 4.32\\ hi^{a}=4,\\ 5.78\\ 4.32\\ hi^{a}=0,\\ 10\\ (P<0)\\ 225\\ 3.87\\ 73.2\\ (Chi^{a}=0)\\ (P=0)\\ (P$	118.78, 118.78, 115.78 129.10, (0.2) 129.10, (0.2) 117.73 114 130 175 130 175 130 175 130 175 130 175 130 175 143 175 130 175 143 175 143 175 143 175 143 175 143 143 143 143 145 143 145 143 145 143 145 143 145 145 145 145 145 155 155 155	ff = 19 (df = 3 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75 92.2 44.33 3 (P = 1) 36.8 40.1 108.4 df = 2 (P < 0.1 (P = 0. CS 5D 6.12 0.22); 21.7 3.09 6.87 5.22 0.89); 24 8.03 82.2 P = 0.1	145 20001); 873 20001); 0005; Total 49 47 49 25 170 (⁷ = 32° 49 47 49 25 170 (⁷ = 32° 170 (⁷ = 32° 170 49 49 49 49 49 49 49 49 49 49	15.1% P = 98% 100.0% P = 96% P = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3% 4.6% 11.2% 37.3% 9.9% 11.2% 4.3% 25.4% = 82% 100.0%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference <u>W. Random, 95% CI</u> 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.93, -8.37] -0.20 [-29.14, 28.74] -0.20 [-20.14, 28.7	Favours (PRP) Favours (CS) Mean Difference IV. Random. 95% CI
Heterogeneity: Tau ² = Fest for overall effect: Total (95% CI) Heterogeneity: Tau ² = Fest for overall effect: Test for subaroup diff Study or Subgroup L.1.DASH Imonth Jougha 2019 Peerbooms 2010 Yearbooms 2010 Yearbooms 2010 Yearbooms 2010 Yearbooms 2010 Yearbooms 2011 Yearbooms 2011 Yearbooms 2010 Yearbooms 2010	Z = 1.42 3.08; C Z = 2.41 Mean 4.3.1 64.15 136.9 62.5 1.8.3; C Z = 9.15 21.3 35.1 92 34.16 0.00; C Z = 16.5 210 31.65 54.7 100.34; Z = 2.6C 149.71;	$\begin{array}{l} (P=0) \\ (P=0) \\$	118.78, 118.78, 118.78, 119.77 110.22 110.22 110.22 117.73 110.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111.22 111	ff = 19 (df = 3 31.2 53.25 97.4 53.13 3 (P =) 32.3 44.75 92.2 44.33 3 (P = 1) 36.8 40.1 108.4 df = 2 (P < 0.1 (P = 0. CS 5D 6.12 0.22); 21.7 3.09 6.87 5.22 0.89); 24 8.03 82.2 P = 0.1	145 20001); 873 20001); 0005; Total 49 47 49 25 170 (⁷ = 32° 49 47 49 25 170 (⁷ = 32° 170 (⁷ = 32° 170 49 49 49 49 49 49 49 49 49 49	15.1% P = 98% 100.0% P = 96% P = 83.1% Weight 10.1% 11.3% 4.6% 11.2% 37.3% 4.6% 11.2% 37.3% 9.9% 11.2% 4.3% 25.4% = 82% 100.0%	-4.22 [-10.03, 1.59] -1.02 [-1.85, -0.19] Mean Difference <u>W. Random, 95% CI</u> 11.90 [3.59, 20.21] 10.90 [9.71, 12.09] 38.50 [9.66, 67.34] 9.37 [6.20, 12.54] 10.67 [8.39, 12.96] -11.00 [-19.57, -2.43] -9.65 [-10.93, -8.37] -0.20 [-29.14, 28.74] -0.20 [-20.14, 28.7	Favours (PRP) Favours (CS)

Fig. 5 Forest plot.humeral external epicondylitis. Outcomes: visual analog scale score for pain, and Disabilities of the Arm, Shoulder and Hand. PRP: platelet-rich plasma; CS: corticosteroid; SD: standard deviation; 95% CI: 95% confidence interval

healing and therapeutic outcomes remains unclear [49]. Some studies have indicated that the white blood cells in PRP enhance pro-inflammatory activity through the expression of catabolic cascades and the release of inflammatory markers, which may potentially influence the expression of other growth factors within PRP [50]. Moreover, the relatively small area of the glenoid fossa in the shoulder joint can only accommodate one-third to one-fourth of the humeral head. This structural configuration endows the shoulder joint with a relatively large



Test for subaroup differences: $Chi^2 = 14.42$, df = 2 (P = 0.0007), $I^2 = 86.1\%$

Fig. 6 Forest plot. plantar fasciitis. Outcomes: visual analog scale score for pain, and Ankle Hindfood Scale. PRP: platelet-rich plasma; CS: corticosteroid; SD: standard deviation; 95% CI: 95% confidence interval

range of motion, yet it consequently exhibits relatively poor stability. The maintenance of stability in the shoulder joint, which is crucial for performing various movements, relies on the rotator cuff muscles [51]. Therefore, it may require a longer follow-up period to determine the effect of PRP on functional improvement. The follow-up duration in the literature selected for this study is still relatively short, and there is a deficiency in research on PRP's improvement of functional impairments. Hence, evidence regarding PRP's enhancement of tendonopathy functional activities still awaits further large-scale, multicenter clinical studies with longer follow-up periods.

Overall, PRP effectively alleviates tendon pain and functional impairment, exhibiting superior mid-term efficacy and enhanced safety. However, this study does have certain limitations: firstly, the inclusion of a broad range of diseases without in-depth investigation into specific condition indicators may diminish the credibility of the findings. Additionally, the limited number of studies, specifically two articles related to tenosynovitis, coupled with inconsistent reported indicators for rotator cuff injuries, poses a significant risk of impacting the final outcomes. In future clinical studies, emphasis should be placed on the comprehensiveness and consistency of outcome measures. Furthermore, the duration of followup is frequently insufficient; the longest follow-up in the included studies was 24 months, with only 8 out of 27 trials assessing the long-term (≥ 12 months) effects of PRP. Consequently, comparisons of each clinical condition at the 12-month mark are often restricted to just one or two

Study or Subgroup	l Mean	PRP SD	Total	Mean	CS SD	Total	Weight	Mean Difference IV, Random, 95% Cl	Mean Difference IV, Random, 95% Cl
7.1.1 VAS 1month	moun	00	Total	moun	00	Total	Trongine	11,11,11,11,10,11,00,10,01	
Kumar 2023	3.67	2.6	30	2.27	2.33	30	13.2%	0.40 [-0.85, 1.65]	
Shoma 2023	5.6	0.7	33	5.3	0.5	31	18.5%		_ _ _
Subtotal (95% CI)	0.0	0.7	63	0.5	0.0	61	31.7%	• • •	•
Heterogeneity: Tau ² :	- 0.00. 04			1 /P -	n 00\·			0.51 [0.02, 0.55]	•
Test for overall effect				(0.00),	1 - 0 %	,		
7.1.2 VAS 3month									
Kumar 2023	1.84		30		2.32	30		• • •	
Shoma 2023	3.5	0.7	33	5.3	0.5	31	18.5%		
Subtotal (95% CI)			63			61	33.0%	-1.23 [-2.53, 0.07]	
Heterogeneity: Tau² Test for overall effect			•	:1 (P =	0.02);	I² = 83	%		
7.1.3 VAS 6month	0.00	0.00	20	4 3 3	4.04	20	40.000	0 40 / 4 00 0 201	
Kumar 2023 Shomo 2022	0.83		30		1.61	30 31	16.8%		I
Shoma 2023 Subtotal (05% CI)	1.7	0.7	33 63	2.5	0.6	61	18.4% 35.2%	• • •	▲
Subtotal (95% CI)	- 0.04 - 01	- iZ - 1		. 1 /D -	0.201			-0.72 [-1.04, -0.40]	•
Heterogeneity: Tau ² : Test for overall effect				: I (F =	0.29),	1-= 9%	0		
Total (95% Cl)			189			183	100.0%	-0.51 [-1.34, 0.32]	
Heterogeneity: Tau ² :	- 0.061 CH	ni≅ — 1 (4f -	~ ^ ^ ^			-0.51[-1.54, 0.52]	
Test for overall effect				n – 5 (r	~ 0.0	0001),	1 - 35 %		-2 -1 0 1 2
	. 2 - 1.20	(1 - 0)	.20)						Ferreure (BDD) Ferreure (CC)
 Toet for subaroun dir 	fforoncoc	∙ Chi≊ -	- 24 16	df = 2	(P < 0	00001) IZ – Q1 1	7%	Favours (PRP) Favours (CS)
Test for subaroup di	fferences	: Chi² =	= 24.15	. df = 2	(P < 0	.00001), I² = 91.1	7%	ravouis (rkrj ravouis (Coj
Test for subaroup di	fferences		= 24.15	. df = 2		.00001			
		PRP			cs		5	Std. Mean Difference	Std. Mean Difference
Test for subaroup di <u>Study or Subaroup</u> 8.1.1 functional que	Mean	PRP SD	Total	. df = 2 <u>Mean</u>	cs				
Study or Subgroup	<u>Mean</u> estionnair	PRP SD	<u>Total</u>		CS SD		5	Std. Mean Difference	Std. Mean Difference
<u>Study or Subgroup</u> 8.1.1 functional que	<u>Mean</u> estionnair	PRP <u>SD</u> es 1me	<u>Total</u> onth 30	Mean	CS SD 11.2	Total	s Weight	Std. Mean Difference IV, Random, 95% Cl	Std. Mean Difference
<u>Study or Subgroup</u> 8.1.1 functional que Kumar 2023 Shoma 2023 Subtotal (95% CI)	Mean estionnair 75.5 66.7	PRP <u>SD</u> es 1m 11.32 4.8	<u>Total</u> onth 30 33 63	<u>Mean</u> 75.67 56.8	CS SD 11.2 5.8	Total 30 31 61	Weight 16.9% 16.6% 33.6%	Std. Mean Difference <u>IV, Random, 95% Cl</u> -0.01 [-0.52, 0.49]	Std. Mean Difference
<u>Study or Subgroup</u> 8.1.1 functional que Kumar 2023 Shoma 2023	<u>Mean</u> estionnair 75.5 66.7 * = 1.65; C	PRP <u>SD</u> 11.32 4.8 hi ² = 21	Total onth 30 63 1.91, df	<u>Mean</u> 75.67 56.8	CS SD 11.2 5.8	Total 30 31 61	Weight 16.9% 16.6% 33.6%	Std. Mean Difference <u>IV, Random, 95% Cl</u> -0.01 [-0.52, 0.49] 1.84 [1.25, 2.43]	Std. Mean Difference
<u>Study or Subgroup</u> 8.1.1 functional qua Kumar 2023 Shoma 2023 Subtotal (95% CI) Heterogeneity: Tau ³	<u>Mean</u> estionnair 75.5 66.7 * = 1.65; C ct: Z = 0.98	PRP <u>SD</u> es 1m(11.32 4.8 hi ² = 21 } (P = 0	<u>Total</u> onth 30 33 63 1.91, df .33)	<u>Mean</u> 75.67 56.8	CS SD 11.2 5.8	Total 30 31 61	Weight 16.9% 16.6% 33.6%	Std. Mean Difference <u>IV, Random, 95% Cl</u> -0.01 [-0.52, 0.49] 1.84 [1.25, 2.43]	Std. Mean Difference
Study or Subgroup 8.1.1 functional que Kumar 2023 Shoma 2023 Subtotal (95% CI) Heterogeneity: Tau ² Test for overall effer	<u>Mean</u> estionnair 75.5 66.7 * = 1.65; C ct: Z = 0.98	PRP <u>SD</u> es 1m(11.32 4.8 hi ² = 21 } (P = 0	Total onth 30 33 63 1.91, df: .33) onth	<u>Mean</u> 75.67 56.8 = 1 (P <	CS SD 11.2 5.8	Total 30 31 61	Weight 16.9% 16.6% 33.6%	Std. Mean Difference IV, Random, 95% Cl -0.01 [-0.52, 0.49] 1.84 [1.25, 2.43] 0.91 [-0.91, 2.73]	Std. Mean Difference
Study or Subgroup 8.1.1 functional que Kumar 2023 Shoma 2023 Subtotal (95% CI) Heterogeneity: Tau ² Test for overall effec 8.1.2 functional que	<u>Mean</u> 25.5 66.7 2 = 1.65; C ct: Z = 0.98 estionnair	PRP sD es 1m 11.32 4.8 hi ² = 21 } (P = 0 es 3m	Total onth 30 33 63 1.91, df: .33) onth 30	<u>Mean</u> 75.67 56.8 = 1 (P <	CS SD 11.2 5.8 0.000	<u>Total</u> 30 31 61 01); I² =	5 Weight 16.9% 16.6% 33.6% 95%	Std. Mean Difference <u>IV, Random, 95% Cl</u> -0.01 [-0.52, 0.49] 1.84 [1.25, 2.43]	Std. Mean Difference
Study or Subgroup 8.1.1 functional que Kumar 2023 Shoma 2023 Subtotal (95% CI) Heterogeneity: Tau ² Test for overall effer 8.1.2 functional que Kumar 2023 Shoma 2023 Subtotal (95% CI)	Mean estionnair 75.5 66.7 ² = 1.65; C ct: Z = 0.98 estionnair 82.83 75.3	PRP sD es 1m 11.32 4.8 hi ² = 21 (P = 0 es 3m 8.68 4.7	<u>Total</u> 30 33 63 1.91, df .33) onth 30 33 63	<u>Mean</u> 75.67 56.8 = 1 (P < 82.3 65.8	CS SD 11.2 5.8 0.0000 9.34 4.8	<u>Total</u> 30 31 61 01); I² = 30 31 61	5 Weight 16.9% 16.6% 33.6% 95% 16.9% 16.6% 33.5%	Std. Mean Difference <u>IV, Random, 95% Cl</u> -0.01 [-0.52, 0.49] 1.84 [1.25, 2.43] 0.91 [-0.91, 2.73] 0.06 [-0.45, 0.56]	Std. Mean Difference
Study or Subgroup 8.1.1 functional que Kumar 2023 Shoma 2023 Subtotal (95% Cl) Heterogeneity: Tau ² Test for overall effer 8.1.2 functional que Kumar 2023 Shoma 2023	<u>Mean</u> estionnair 75.5 66.7 *= 1.65; C ct: Z = 0.98 estionnair 82.83 75.3 *= 1.76; C	PRP sD es 1m 11.32 4.8 hi ² = 21 (P = 0 es 3m 8.68 4.7 hi ² = 22	<u>Total</u> onth 30 33 63 1.91, df: .33) onth 30 33 63 2.75, df:	<u>Mean</u> 75.67 56.8 = 1 (P < 82.3 65.8	CS SD 11.2 5.8 0.0000 9.34 4.8	<u>Total</u> 30 31 61 01); I² = 30 31 61	5 Weight 16.9% 16.6% 33.6% 95% 16.9% 16.6% 33.5%	Std. Mean Difference <u>IV, Random, 95% Cl</u> -0.01 [-0.52, 0.49] 1.84 [1.25, 2.43] 0.91 [-0.91, 2.73] 0.06 [-0.45, 0.56] 1.98 [1.37, 2.58]	Std. Mean Difference
Study or Subgroup 8.1.1 functional que Kumar 2023 Shoma 2023 Subtotal (95% CI) Heterogeneity: Tau ² Test for overall effec 8.1.2 functional que Kumar 2023 Shoma 2023 Subtotal (95% CI) Heterogeneity: Tau ²	Mean estionnair 75.5 66.7 *= 1.65; C t: Z = 0.96 estionnair 82.83 75.3 *= 1.76; C t: Z = 1.05	PRP sD es 1m 11.32 4.8 hi ² = 21) (P = 0 es 3m 8.68 4.7 hi ² = 22 5 (P = 0	Total 30 33 63 1.91, df .33) 00000 30 63 2.75, df .29)	<u>Mean</u> 75.67 56.8 = 1 (P < 82.3 65.8	CS SD 11.2 5.8 0.0000 9.34 4.8	<u>Total</u> 30 31 61 01); I² = 30 31 61	5 Weight 16.9% 16.6% 33.6% 95% 16.9% 16.6% 33.5%	Std. Mean Difference <u>IV, Random, 95% Cl</u> -0.01 [-0.52, 0.49] 1.84 [1.25, 2.43] 0.91 [-0.91, 2.73] 0.06 [-0.45, 0.56] 1.98 [1.37, 2.58]	Std. Mean Difference
Study or Subgroup 8.1.1 functional que Kumar 2023 Shoma 2023 Subtotal (95% Cl) Heterogeneity: Tau ² Test for overall effer 8.1.2 functional que Kumar 2023 Shoma 2023 Subtotal (95% Cl) Heterogeneity: Tau ² Test for overall effer 8.1.3 functional que Kumar 2023	<u>Mean</u> 75.5 66.7 2 = 1.65; C ct: Z = 0.96 estionnair 82.83 75.3 2 = 1.76; C ct: Z = 1.05 estionnair 92.5	PRP <u>SD</u> 11.32 4.8 hi ² = 21 9 (P = 0 8.68 4.7 hi ² = 22 (P = 0 6 (P = 0 4.1	Total 30 33 63 1.91, df 33 33 63 2.75, df .29) 50th 30	<u>Mean</u> 75.67 56.8 = 1 (P < 82.3 65.8 = 1 (P < 90.83	CS SD 11.2 5.8 0.0000 9.34 4.8 0.0000 5.88	Total 30 31 61 01); I ² = 30 31 61 01); I ² = 30	Weight 16.9% 16.6% 33.6% 95% 16.9% 16.6% 33.5% 96%	Std. Mean Difference <u>IV, Random, 95% Cl</u> -0.01 [-0.52, 0.49] 1.84 [1.25, 2.43] 0.91 [-0.91, 2.73] 0.06 [-0.45, 0.56] 1.98 [1.37, 2.58] 1.01 [-0.87, 2.89] 0.33 [-0.18, 0.83]	Std. Mean Difference
Study or Subgroup 8.1.1 functional que Kumar 2023 Shoma 2023 Subtotal (95% Cl) Heterogeneity: Tau ² Test for overall effec 8.1.2 functional que Kumar 2023 Shoma 2023 Subtotal (95% Cl) Heterogeneity: Tau ² Test for overall effec 8.1.3 functional que	<u>Mean</u> 75.5 66.7 * = 1.65; C ct: Z = 0.96 estionnair 82.83 75.3 * = 1.76; C ct: Z = 1.05 estionnair	PRP es 1m 11.32 4.8 hi ² = 21 3 (P = 0 es 3m 8.68 4.7 hi ² = 22 5 (P = 0 es 6m	Total 30 33 63 1.91, df 33 33 63 2.75, df .29) 50th 30	<u>Mean</u> 75.67 56.8 = 1 (P < 82.3 65.8 = 1 (P <	CS SD 11.2 5.8 0.0000 9.34 4.8 0.0000 5.88	Total 30 31 61 01); I ² = 30 31 61 01); I ² =	Weight 16.9% 16.6% 33.6% 95% 16.9% 16.6% 33.5% 96%	Std. Mean Difference <u>IV, Random, 95% Cl</u> -0.01 [-0.52, 0.49] 1.84 [1.25, 2.43] 0.91 [-0.91, 2.73] 0.06 [-0.45, 0.56] 1.98 [1.37, 2.58] 1.01 [-0.87, 2.89]	Std. Mean Difference
Study or Subgroup 8.1.1 functional que Kumar 2023 Shoma 2023 Subtotal (95% Cl) Heterogeneity: Tau ² Test for overall effer 8.1.2 functional que Kumar 2023 Shoma 2023 Subtotal (95% Cl) Heterogeneity: Tau ² Test for overall effer 8.1.3 functional que Kumar 2023 Shoma 2023	Mean estionnair 75.5 66.7 * = 1.65; C ct: Z = 0.98 estionnair 82.83 75.3 * = 1.76; C ct: Z = 1.05 estionnair 92.5 87.9 * = 4.28; C	PRP SD es 1m 11.32 4.8 hi ² = 21 (P = 0 8.68 4.7 hi ² = 22 5 (P = 0 es 3m 4.7 hi ² = 22 5 (P = 0 8.68 4.7 hi ² = 21 3.7 hi ² = 39 hi ³ =	Total 30 33 63 1.91, df: 33) onth 30 33 63 2.75, df: .29) onth 30 33 63 3.85, df: 3.85, df: 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05 3.05	Mean 75.67 56.8 = 1 (P < 82.3 65.8 = 1 (P < 90.83 73.7	CS SD 11.2 5.8 0.0000 9.34 4.8 0.0000 5.88 4.8	Total 30 31 61 01); ² = 30 31 61 01); ² = 30 31 61 01); ² = 30 31 61 01); ² = 30 31 61 30 31 61	Weight 16.9% 16.6% 33.6% 95% 16.9% 16.9% 16.9% 16.9% 16.9% 16.9% 32.9%	Std. Mean Difference <u>IV, Random, 95% Cl</u> -0.01 [-0.52, 0.49] 1.84 [1.25, 2.43] 0.91 [-0.91, 2.73] 0.06 [-0.45, 0.56] 1.98 [1.37, 2.58] 1.01 [-0.87, 2.89] 0.33 [-0.18, 0.83] 3.29 [2.52, 4.05]	Std. Mean Difference

Fig. 7 Forest plot. tenosynovitis. Outcomes: visual analog scale score for pain, and Ankle Hindfood Scale. PRP: platelet-rich plasma; CS: corticosteroid; SD: standard deviation; 95% CI: 95% confidence interval

trials. As suggested by some researchers, the optimal clinical benefits of PRP in orthopedics may become apparent in the long-term phase. However, in the long-term follow-up analyzed in this study, PRP did not demonstrate a significant advantage over the control group. Currently, there is an absence of definitive methodological

Heterogeneity: Tau² = 1.37; Chi² = 87.31, df = 5 (P < 0.00001); l² = 94%

Test for subaroup differences: $Chi^2 = 0.27$. df = 2 (P = 0.87). l² = 0%

Test for overall effect: Z = 2.48 (P = 0.01)

characteristics required to confirm the clinical efficacy of PRP in treating tendinopathies. Furthermore, there is no clear consensus regarding the types of products, standards, or application protocols. The methods for producing PRP are highly variable, contingent upon the diverse instruments and concentration techniques employed.

ń

Favours [CS] Favours [PRP]

-4 -2

	PRF)	CS			Odds Ratio	Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% Cl	M-H, Fixed, 95% Cl
Hewavithana 2023	13	30	18	30	40.1%	0.51 [0.18, 1.42]	
Kumar 2023	0	30	8	30	32.9%	0.04 [0.00, 0.79]	
Shoma 2023	1	33	0	31	1.9%	2.91 [0.11, 74.09]	
Tabrizi 2019	4	15	9	16	25.1%	0.28 [0.06, 1.28]	
Total (95% CI)		108		107	100.0%	0.35 [0.17, 0.72]	•
Total events	18		35				
Heterogeneity: Chi ² =	4.24, df=	3 (P =	0.24); l² =	= 29%			
Test for overall effect:	Z= 2.85	(P = 0.0)04)				0.001 0.1 1 10 1000 Favours (PRP) Favours (CS)

	PRP	•	CS			Odds Ratio		Odds Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% Cl		M-H, Fixed, 95% Cl	
Arik 2014	38	40	25	40	3.4%	11.40 [2.40, 54.22]		· · · · · · · · · · · · · · · · · · ·	_
Gosens 2011	39	51	21	49	13.6%	4.33 [1.83, 10.24]		— -	
Jain 2018	38	40	35	40	4.7%	2.71 [0.49, 14.90]			
Kumar 2023	28	30	27	30	4.9%	1.56 [0.24, 10.05]			
Kwong 2021	44	47	46	52	7.5%	1.91 [0.45, 8.12]			
Peerbooms 2010	37	51	24	49	18.1%	2.75 [1.20, 6.32]		-	
Peerbooms 2019	39	63	20	52	22.5%	2.60 [1.22, 5.53]		-	
Sawan 2023	25	30	19	30	8.6%	2.89 [0.86, 9.74]		+	
Senna 2019	43	49	42	49	13.9%	1.19 [0.37, 3.85]			
Sharma 2023	45	45	42	45	1.2%	7.49 [0.38, 149.40]			\rightarrow
Vahdatpour 2015	15	16	9	16	1.5%	11.67 [1.23, 110.95]			
Total (95% CI)		462		452	100.0%	3.09 [2.18, 4.39]		•	
Total events	391		310						
Heterogeneity: Chi ² =	8.75, df =	10 (P =	= 0.56); l ^a	= 0%				0.1 1 10	100
Test for overall effect:	Z = 6.32 ((P < 0.0	00001)				0.01	Favours [CS] Favours [PRP]	100

Fig. 8 Forest plot. Outcome: treatment response and adverse events. PRP: platelet-rich plasma; CS: corticosteroid; M-H: Mantel–Haenszel; 95%CI: 95% confidence interval

	PRP	•	CS			Odds Ratio		Odds Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% Cl		M-H, Fixed, 95% Cl	
Arik 2014	38	40	25	40	4.8%	11.40 [2.40, 54.22]			
Jain 2018	38	40	35	40	6.8%	2.71 [0.49, 14.90]			
Kumar 2023	28	30	27	30	7.0%	1.56 [0.24, 10.05]			
Kwong 2021	44	47	46	52	10.8%	1.91 [0.45, 8.12]			
Peerbooms 2010	37	51	24	49	26.0%	2.75 [1.20, 6.32]			
Peerbooms 2019	39	63	20	52	32.3%	2.60 [1.22, 5.53]			
Sawan 2023	25	30	19	30	12.3%	2.89 [0.86, 9.74]		+	
Total (95% CI)		301		293	100.0%	2.96 [1.94, 4.52]		•	
Total events	249		196						
Heterogeneity: Chi ² =	3.83, df =	6 (P =	0.70); l² =	= 0%			L		400
Test for overall effect:	Z = 5.03 ((P < 0.0	00001)				0.01	0.1 1 10 Favours [CS] Favours [PR]	100

Fig. 9 Sensitivity analysis for efficiency

Not all PRP treatments are uniform; significant variations are attributed to the initial blood volume, the centrifugation system employed, the platelet concentration within the PRP, and the method of activation. Standardization of the PRP dosage administered each time is essential. The injection depth and the spacing between injection sites are also critical.

Conclusions

This meta-analysis has shown that that PRP may offer a favorable therapeutic effect on tendinopathy, with superior mid-term efficacy compared to CS, particularly regarding pain improvement. Furthermore, in terms of AEs incidence, the rate associated with PRP injections is lower than that with CS injections, implying a potentially

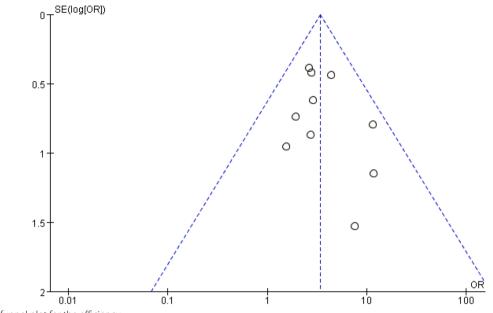


Fig. 10 The funnel plot for the efficiency

higher safety profile for PRP compared to CS. However, additional well-designed, large-scale randomized controlled trials are necessary to more accurately establish the indications for PRP as a conservative orthopedic treatment, along with its long-term benefits and optimal treatment protocols.

Abbreviations

RCTs	Randomized controlled trials
PRP	Platelet-rich plasma
CS	Corticosteroid
NSAIDs	Non-steroidal anti-inflammatory drugs
MD	Mean Difference
SMD	Standardized Mean Difference
SD	Standard deviations
AOFAS	American Orthopaedic Foot and Ankle Society
DASH	Disabilities of the Arm, Shoulder and Hand questionnaire
FFI	Foot function index
VAS	Visual analog scale
WORC	Western Ontario Rotator Cuff
ASES	American Shoulder and Elbow Surgeons
OSS	Oxford Shoulder Score
ROM	Range of motion
MAYO	Elbow joint function score

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12891-025-08566-3.

Supplementary Material 1.

Acknowledgements

To the best of our knowledge, no conflict of interest, financial or other.

Clinical trial number

Not applicable.

Authors' contributions

YZ and LM conceived and designed the study. YY and QL developed the search strategy and did the literature search. KG assessed the quality of study. YZ, TX and WZ collected the data and performed all analysis. YZ and LM contributed to writing of original manuscript. All authors read and approved the final manuscript.

Funding

This work was funding by the National Natural Science Foundation of China (No.82174414, No.82274543).

Data availability

All data generated or analyzed during this study are included in this published article [and its supplementary information files].

Declarations

Ethics approval and consent to participate

Since our study is a meta-analysis, an Ethical Review Committee Statement is not required.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Hunan University of Chinese Medicine, Changsha 410208, China. ²The First Hospital of Hunan University of Chinese Medicine, Changsha 410007, China. ³Affiliated Hospital of Hunan Academy of Traditional Chinese Medicine, Changsha 410006, China.

Received: 7 November 2024 Accepted: 20 March 2025 Published online: 08 April 2025

References

1. Gosens T, Peerbooms JC, van Laar W, den Oudsten BL. Ongoing positive effect of platelet-rich plasma versus corticosteroid injection in lateral epicondylitis: a double-blind randomized controlled trial with 2-year

follow-up. Am J Sports Med. 2011;39(6):1200-8. https://doi.org/10.1177/0363546510397173.

- Monto RR. Platelet-rich plasma efficacy versus corticosteroid injection treatment for chronic severe plantar fasciitis. Foot Ankle Int. 2014;35(4):313–8. https://doi.org/10.1177/1071100713519778.
- Malliaras P, Barton CJ, Reeves ND, Langberg H. Achilles and patellar tendinopathy loading programmes: a systematic review comparing clinical outcomes and identifying potential mechanisms for effectiveness. Sports Med. 2013;43(4):267–86. https://doi.org/10.1007/s40279-013-0019-z.
- Krogh TP, Fredberg U, Stengaard-Pedersen K, Christensen R, Jensen P, Ellingsen T. Treatment of lateral epicondylitis with platelet-rich plasma, glucocorticoid, or saline: a randomized, double-blind, placebo-controlled trial. Am J Sports Med. 2013;41(3):625–35. https://doi.org/10.1177/0363546512472975.
- Millar NL, Silbernagel KG, Thorborg K, Kirwan PD, Galatz LM, Abrams GD, Murrell GAC, McInnes IB, Rodeo SA. Tendinopathy. Nat Rev Dis Primers. 2021;7(1):1. https://doi.org/10.1038/s41572-020-00234-1.
- Fang Y, Zhu D, Wei J, Qian L, Qiu R, Jia T, Huang K, Zhao S, Ouyang J, Li M, Li S, Li Y. Collagen denaturation in post-run achilles tendons and achilles tendinopathy: in vivo mechanophysiology and magnetic resonance imaging. Sci Adv. 2024;10(40):eado2015. https://doi.org/10.1126/sciadv.ado2015.
- Freedman BR, Mooney DJ, Weber E. Advances toward transformative therapies for tendon diseases. Sci Transl Med. 2022;14(661):eabl8814. https://doi.org/10.1126/scitranslmed.abl8814.
- Shams A, El-Sayed M, Gamal O, Ewes W. Subacromial injection of autologous platelet-rich plasma versus corticosteroid for the treatment of symptomatic partial rotator cuff tears. Eur J Orthop Surg Traumatol. 2016;26(8):837–42. https://doi.org/10.1007/s00590-016-1826-3.
- Kawabata S, Akeda K, Yamada J, Takegami N, Fujiwara T, Fujita N, Sudo A. Advances in platelet-rich plasma treatment for spinal diseases: a systematic review. Int J Mol Sci. 2023;24(8): 7677. https://doi.org/10.3390/ijms24087677.
- Sheean AJ, Anz AW, Bradley JP. Platelet-rich plasma: fundamentals and clinical applications. Arthroscopy. 2021;37(9):2732–4. https://doi.org/10. 1016/j.arthro.2021.07.003.
- 11. Field LD. Editorial commentary: elbow lateral epicondylitis treatment using platelet-rich plasma. Arthroscopy. 2021;37(11):3368–70. https://doi. org/10.1016/j.arthro.2021.05.048.
- 12. Wang S, Liu X, Wang Y. Evaluation of platelet-rich plasma therapy for peripheral nerve regeneration: a critical review of literature. Front Bioeng Biotechnol. 2022;10(1): 808248. https://doi.org/10.3389/fbioe.2022.808248.
- Dadgostar H, Fahimipour F, Pahlevan Sabagh A, Arasteh P, Razi M. Corticosteroids or platelet-rich plasma injections for rotator cuff tendinopathy: a randomized clinical trial study. J Orthop Surg Res. 2021;16(1):333. https://doi.org/10.1186/s13018-021-02470-x.
- Varshney A, Maheshwari R, Juyal A, Agrawal A, Hayer P. Autologous platelet-rich plasma versus corticosteroid in the management of elbow epicondylitis: a randomized study. Int J Appl Basic Med Res. 2017;7(2):125–8. https://doi.org/10.4103/2229-516X.205808.
- Jain SK, Suprashant K, Kumar S, Yadav A, Kearns SR. Comparison of plantar fasciitis injected with platelet-rich plasma vs corticosteroids. Foot Ankle Int. 2018;39(7):780–6. https://doi.org/10.1177/1071100718762406.
- Ibrahim DH, El-Gazzar NM, El-Saadany HM, El-Khouly RM. Ultrasoundguided injection of platelet rich plasma versus corticosteroid for treatment of rotator cuff tendinopathy: effect on shoulder pain, disability, range of motion and ultrasonographic findings. Egypt Rheumatol. 2019;41(2):157–61. https://doi.org/10.1016/j.ejr.2018.06.004.
- Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, Shamseer L, Tetzlaff JM, Akl EA, Brennan SE, Chou R, Glanville J, Grimshaw JM, Hróbjartsson A, Lalu MM, Li T, Loder EW, Mayo-Wilson E, McDonald S, McGuinness LA, Stewart LA, Thomas J, Tricco AC, Welch VA, Whiting P, Moher D. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021;372: n71. https://doi.org/10.1136/bmj.n71.
- Cumpston M, Li T, Page MJ, Chandler J, Welch VA, Higgins JP, Thomas J. Updated guidance for trusted systematic reviews: a new edition of the cochrane handbook for systematic reviews of interventions. Cochrane Database Syst Rev. 2019;10(10):ED000142. https://doi.org/10.1002/14651858.
- Sawan ZH, El-Tohamy SA, Elhossieny KM, Basha OHAH, Hafez AS. Analgesic efficacy and functional outcome in refractory cases of plantar fasciitis treated with platelet-rich plasma: randomized comparative study with corticosteroids injection. EJA. 2023;39(1):477–87. https://doi.org/10.1080/ 11101849.2023.2224651.

- Vahdatpour B, Kianimehr L, Moradi A, Haghighat S. Beneficial effects of platelet-rich plasma on improvement of pain severity and physical disability in patients with plantar fasciitis: a randomized trial. Adv Biomed Res. 2016;5(1):179. https://doi.org/10.4103/2277-9175.192731.
- Abd El Wahhab HD, Emran TM, Ahmed AAS, Abd El Ham ESM, Khalifa MM. Comparative study of local injection of platelet rich plasma versus corticosteroids in the treatment of lateral epicondylitis (tennis elbow). BJHM. 2018;73(7):7119–26. https://doi.org/10.21608/ejhm.2018.17510.
- Thepsoparn M, Thanphraisan P, Tanpowpong T, Itthipanichpong T. Comparison of a platelet-rich plasma injection and a conventional steroid injection for pain relief and functional improvement of partial supraspinatus tears. Orthop J Sports Med. 2021;9(9): 23259671211024937. https:// doi.org/10.1177/23259671211024937.
- Kumar V, Talwar J, Rustagi A, Krishna LG, Sharma VK. Comparison of clinical and functional outcomes after platelet-rich plasma injection and corticosteroid injection for the treatment of de Quervain's tenosynovitis. J Wrist Surg. 2022;12(2):135–42. https://doi.org/10.1055/s-0042-1760124.
- Khurana A, Dhankhar V, Goel N, Gupta R, Goyal A. Comparison of midterm results of platelet rich plasma (PRP) versus steroid for plantar fasciitis: a randomized control trial of 118 patients. J Clin Orthop Trauma. 2020;13(6):9–14. https://doi.org/10.1016/j.jcot.2020.09.002. Erratum in: J Clin Orthop Trauma. 2021 Oct;21:101559.
- Kumar K, Rao V, Panda A, Sathyendra KG, Buddhist H. Comparison of platelet-rich plasma and corticosteroid injections for chronic plantar fasciitis: a randomized controlled trial. Cureus. 2024;16(5):e59656. https:// doi.org/10.7759/cureus.59656.
- Shoma FK, Chowdhury ZR, Khan MM, Bhuiyan MK, Khandaker MN, Islam MT. Comparison of the effect of intralesional injection of corticosteroid and platelet-rich plasma in patients with de Quervain's tenosynovitis: effect of intralesional injection of corticosteroid and platelet-rich plasma. BMRC Bull. 2023;49(1):32–8. https://doi.org/10.3329/bmrcb.v49i1.62418.
- Saleem U, Afzal MK, Saqib M, Azam MF. Comparison of local corticosteroids versus plasma rich protein for management of rotator cuff tendinopathy. Pak J Med. 2022;16(03):112–112. https://doi.org/10.53350/ pjmhs22163112.
- Sharma R, Chaudhary NK, Karki M, Sunuwar DR, Singh DR, Pradhan PMS, Gyawali P, Duwal Shrestha SK, Bhandari KK. Effect of platelet-rich plasma versus steroid injection in plantar fasciitis: a randomized clinical trial. BMC Musculoskelet Disord. 2023;24(1):172. https://doi.org/10.1186/ s12891-023-06277-1.
- Hewavithana PB, Wettasinghe MC, Hettiarachchi G, Ratnayaka M, Suraweera H, Wickramasinghe ND, Kumarasiri PVR. Effectiveness of single intra-bursal injection of platelet-rich plasma against corticosteroid under ultrasonography guidance for shoulder impingement syndrome: a randomized clinical trial. Skeletal Radiol. 2024;53(1):51–8. https://doi.org/ 10.1007/s00256-023-04373-w.
- Arik HO, Kose O, Guler F, Deniz G, Egerci OF, Ucar M. Injection of autologous blood versus corticosteroid for lateral epicondylitis: a randomised controlled study. J Orthop Surg (Hong Kong). 2014;22(3):333–7. https:// doi.org/10.1177/230949901402200313.
- Acosta-Olivo C, Elizondo-Rodriguez J, Lopez-Cavazos R, Vilchez-Cavazos F, Simental-Mendia M, Mendoza-Lemus O. Plantar fasciitis-a comparison of treatment with intralesional steroids versus platelet-rich plasma a randomized, blinded study. J Am Podiatr Med Assoc. 2017;107(6):490–6. https://doi.org/10.7547/15-125.
- Kumar A, Singh H, Rehncy JS, Sandhu KS, Sahni G. Platelet-rich plasma versus steroid injection in rotator cuff tendinopathies–a comparative study. Natl J Physiol Pharm Pharmacol. 2022;12(11):1933–8. https://doi. org/10.5455/njppp.2022.12.0314320220002042022.
- Kwong CA, Woodmass JM, Gusnowski EM, Bois AJ, Leblanc J, More KD, Lo IKY. Platelet-rich plasma in patients with partial-thickness rotator cuff tears or tendinopathy leads to significantly improved short-term pain relief and function compared with corticosteroid injection: a doubleblind randomized controlled trial. Arthroscopy. 2021;37(2):510–7. https:// doi.org/10.1016/j.arthro.2020.10.037.
- Peerbooms JC, Sluimer J, Bruijn DJ, Gosens T. Positive effect of an autologous platelet concentrate in lateral epicondylitis in a double-blind randomized controlled trial: platelet-rich plasma versus corticosteroid injection with a 1-year follow-up. Am J Sports Med. 2010;38(2):255–62. https://doi.org/10.1177/0363546509355445.

- Peerbooms JC, Lodder P, den Oudsten BL, Doorgeest K, Schuller HM, Gosens T. Positive effect of platelet-rich plasma on pain in plantar fasciitis: a double-blind multicenter randomized controlled trial. Am J Sports Med. 2019;47(13):3238–46. https://doi.org/10.1177/0363546519877181. Epub 2019 Oct 11.
- Gupta PK, Acharya A, Khanna V, Roy S, Khillan K, Sambandam SN. PRP versus steroids in a deadlock for efficacy: long-term stability versus short-term intensity-results from a randomised trial. Musculoskelet Surg. 2020;104(3):285–94. https://doi.org/10.1007/s12306-019-00619-w.
- Tabrizi A, Dindarian S, Mohammadi S. The effect of corticosteroid local injection versus platelet-rich plasma for the treatment of plantar fasciitis in obese patients: a single-blind, randomized clinical trial. J Foot Ankle Surg. 2020;59(1):64–8. https://doi.org/10.1053/j.jfas.2019.07.004.
- Yadav R, Kothari SY, Borah D. Comparison of local injection of platelet rich plasma and corticosteroids in the treatment of lateral epicondylitis of humerus. J Clin Diagn Res. 2015;9(7):RC05-7. https://doi.org/10.7860/ JCDR/2015/14087.6213.
- Marigi EM, Cummings PE, Marigi IM, Burgos W, Gillett J, Camp CL, Krych AJ, Okoroha KR. Hamstring injuries: critical analysis review of current nonoperative treatments. JBJS Rev. 2022;10(11). https://doi.org/10.2106/ JBJS.RVW.22.00095.
- Andriolo L, Altamura SA, Reale D, Candrian C, Zaffagnini S, Filardo G. Nonsurgical treatments of patellar tendinopathy: multiple injections of platelet-rich plasma are a suitable option: a systematic review and metaanalysis. Am J Sports Med. 2019;47(4):1001–18. https://doi.org/10.1177/ 0363546518759674.
- Mariani E, Pulsatelli L. Platelet concentrates in musculoskeletal medicine. Int J Mol Sci. 2020;21(4): 1328. https://doi.org/10.3390/ijms21041328.
- Fang J, Wang X, Jiang W, Zhu Y, Hu Y, Zhao Y, Song X, Zhao J, Zhang W, Peng J, Wang Y. Platelet-rich plasma therapy in the treatment of diseases associated with orthopedic injuries. Tissue Eng Part B Rev. 2020;26(6):571–85. https://doi.org/10.1089/ten.TEB.2019.0292.
- Collins T, Alexander D, Barkatali B. Platelet-rich plasma: a narrative review. EFORT Open Rev. 2021;6(4):225–35. https://doi.org/10.1302/2058-5241.6. 200017.
- Kitis A, Celik E, Aslan UB, Zencir M. DASH questionnaire for the analysis of musculoskeletal symptoms in industry workers: a validity and reliability study. Appl Ergon. 2009;40(2):251–5. https://doi.org/10.1016/j.apergo. 2008.04.005.
- Ahmed AF, Rayyan R, Zikria BA, Salameh M. Lateral epicondylitis of the elbow: an up-to-date review of management. Eur J Orthop Surg Traumatol. 2023;33(2):201–6. https://doi.org/10.1007/s00590-021-03181-z.
- Koc TA Jr, Bise CG, Neville C, Carreira D, Martin RL, McDonough CM. Heel pain - plantar fasciitis: revision 2023. J Orthop Sports Phys Ther. 2023;53(12):CPG1–39. https://doi.org/10.2519/jospt.2023.0303.
- Kondrup F, Gaudreault N, Venne G. The deep fascia and its role in chronic pain and pathological conditions: a review. Clin Anat. 2022;35(5):649–59. https://doi.org/10.1002/ca.23882.
- Oh JH, Park MS, Rhee SM. Treatment strategy for irreparable rotator cuff tears. Clin Orthop Surg. 2018;10(2):119–34. https://doi.org/10.4055/cios. 2018.10.2.119.
- Figueroa D, Figueroa F, Calvo R, Vaisman A, Ahumada X, Arellano S. Platelet-rich plasma use in anterior cruciate ligament surgery: systematic review of the literature. Arthroscopy. 2015;31(5):981–8. https://doi.org/10. 1016/j.arthro.2014.11.022.
- Masuki H, Okudera T, Watanebe T, Suzuki M, Nishiyama K, Okudera H, Nakata K, Uematsu K, Su CY, Kawase T. Growth factor and pro-inflammatory cytokine contents in platelet-rich plasma (PRP), plasma rich in growth factors (PRGF), advanced platelet-rich fibrin (A-PRF), and concentrated growth factors (CGF). Int J Implant Dent. 2016;2(1):19. https://doi. org/10.1186/s40729-016-0052-4.
- Huegel J, Williams AA, Soslowsky LJ. Rotator cuff biology and biomechanics: a review of normal and pathological conditions. Curr Rheumatol Rep. 2015;17(1):476. https://doi.org/10.1007/s11926-014-0476-x.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.