The Efficacy of Injections in Plantar Fasciitis: A Systematic Review and Meta-Analysis

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Abstract (Nederlands)

Context

Fasciitis plantaris is de meest voorkomende oorzaak van hielpijn bij volwassenen en heeft een geschatte levenslange incidentie van ongeveer 10%. Hoewel de aandoening vaak spontaan verbetert, kunnen de klachten langdurig aanhouden en een aanzienlijke impact hebben op het dagelijks functioneren. Wanneer conservatieve behandelingen onvoldoende effect hebben, worden injectietherapieën zoals corticosteroïden (CS) en platelet-rich plasma (PRP) vaak toegepast. Het effect van deze behandelingen blijft echter onduidelijk.

Onderzoeksvraag

Het doel van deze studie is om de huidige literatuur te analyseren over de effectiviteit van verschillende injectietherapieën bij fasciitis plantaris en om de klinische effecten van PRP-injecties te vergelijken met CS-injecties aan de hand van een meta-analyse.

Methode

Vier elektronische zoekmachines werden gebruikt (PubMed, Embase, Web of Science en Cochrane Library). Enkel gerandomiseerde gecontroleerde studies (RCT's) werden gebruikt en geselecteerd aan de hand van vooropgestelde criteria. Als primaire outcomes gebruikten we zowel de VAS score als de AOFAS score om respectievelijk pijn en voetfunctie te evalueren. Voor de meta-analyse werden studies gebruikt die PRP rechtstreeks met CS vergeleken.

Resultaten

Vierentwintig RCT's werden geïncludeerd. De meeste injectietherapieën resulteerden in een vermindering van pijn en verbetering van functie. De meta-analyse toonde geen significant verschil tussen PRP en CS na 3 maanden, maar na 6 maanden gaf PRP een significant grotere pijnreductie op basis van de VAS score. Functionele uitkomsten waren meestal beter na PRP, maar zonder statistische significantie.

Conclusie

Zowel PRP- als CS-injecties verbeteren pijn en functie bij fasciitis plantaris. CS geven vooral snelle korte termijn verlichting, terwijl PRP mogelijk betere lange termijn effecten heeft. Verdere hoogkwalitatieve studies zijn nodig om deze bevindingen te bevestigen en de effectiviteit van de andere injecties bij fasciitis plantaris te evalueren.

Abstract (English)

Context

Plantar fasciitis is the most common cause of heel pain in adults and has an estimated lifetime incidence of approximately 10%. Although the condition often improves spontaneously, symptoms can persist for a long time and have a significant impact on daily functioning. When conservative treatments are insufficiently effective, injection therapies such as corticosteroids (CS) and platelet-rich plasma (PRP) are often used. However, the effectiveness of these treatments remains unclear.

Onderzoeksvraag

The aim of this study is to analyze the current literature on the effectiveness of different injection therapies for plantar fasciitis and to compare the clinical effects of PRP injections with CS injections through a meta-analysis.

Methode

Four electronic databases were used (PubMed, Embase, Web of Science, and Cochrane Library). Only randomized controlled trials (RCTs) were included and selected based on predefined criteria. The primary outcomes used were the VAS score for pain and the AOFAS score for foot function. For the meta-analysis, studies directly comparing PRP with CS were included.

Resultaten

Twenty-four RCTs were included. Most injection therapies resulted in a reduction in pain and an improvement in function. The meta-analysis showed no significant difference between PRP and CS after 3 months, but after 6 months PRP resulted in a significantly greater reduction in pain based on the VAS score. Functional outcomes were generally better after PRP, but without statistical significance.

Conclusie

Both PRP and CS injections improve pain and function in plantar fasciitis. CS mainly provides rapid short-term relief, whereas PRP may have better long-term effects. Further high-quality studies are needed to confirm these findings and to better evaluate the effectiveness of other injectable therapies for plantar fasciitis.

Introduction

Plantar fasciitis provoking symptoms of heel pain is a well-known complaint for which patients seek help from a physician. With a 10% lifetime incidence in the general population, plantar fasciitis can be seen as the most common cause of heel pain in adults (1). The historically used term plantar fasciitis suggests an inflammatory pathology, whereas research indicates it is a degenerative process that underlies the pathophysiology. Plantar fasciopathy and fasciosis are more appropriate terms for this condition and despite the incorrect name plantar fasciitis, these 3 terms often overlap in the literature (2). Plantar fasciitis commonly affects athletes, especially runners. But it can affect patients of different levels of activity and of all ages. Both intrinsic and extrinsic factors are considered as risk factors for the onset of plantar fasciitis, such as anatomic abnormalities, overweight and physical overuse (3).

Plantar fasciitis is considered a self-limiting condition, although it can take several months to a year before resolution of symptoms is experienced (4). When patients seek help from a physician, initially conservative treatment will be suggested. Relative rest, ice application and nonsteroidal anti-inflammatory drugs can obtain pain relief. Other well-known treatment options are often used such as stretching and physical therapy, foot orthotics and night splints (1, 5). Usually, when pain remains insufficiently controlled after several weeks, other treatment modalities can be considered, such as local injections or extracorporeal shock wave therapy (ESWT). Together, these non-surgical treatment options offer a success rate of nearly 90%. If symptoms do not improve, a surgical approach may then be considered (6).

Despite the variety of conservative strategies, local injections have become a widely used option in patients with persistent heel pain. Over the years, several injectable therapies have been introduced - ranging from corticosteroids (CS) and platelet-rich plasma (PRP) to autologous blood injections, prolotherapy and botulinum toxin - each aiming to reduce pain and improve function by targeting different components of the underlying degenerative process.

CS injections are the most frequently applied and are known for their short-term anti-inflammatory and analgesic effect, although concerns have been raised regarding potential complications (such as rupture) and limited long-term benefit (7-10).

Biological injections, such as PRP or autologous blood, contain high concentrations of cytokines and growth factors. These play a crucial role in intercellular communication and thereby stimulate tissue healing (7, 11-13). Consequently, they have gained increasing interest as a treatment for chronic plantar fasciopathy.

Other less commonly used injectable options, such as dextrose prolotherapy and botulinum toxin, aim to stimulate tissue regeneration or reduce muscle overactivity, respectively, although their use is less widespread and the evidence remains limited compared to CS and biological injections (14, 15).

ESWT is also considered an established treatment option for chronic plantar fasciitis, particularly when conservative management fails. ESWT is believed to facilitate tissue repair by inducing neovascularization, modulating inflammation, and stimulating cellular regeneration (5, 16-18). However, the present systematic review focuses exclusively on the

effects of injection therapies. ESWT is therefore not included among the conservative comparators in this analysis, in order to allow a clear comparison between different infiltration techniques and standard conservative care.

Although many studies have evaluated individual injection modalities, the literature remains heterogeneous and sometimes conflicting, with varying follow-up durations, outcome measures and comparator treatments. Consequently, the relative effectiveness of different injectable therapies remains uncertain. This systematic review and meta-analysis aims to synthesize current evidence on the benefits of commonly used injection treatments for plantar fasciitis, and to compare their effects against conservative care, thereby providing clinicians with clearer guidance on their efficacy and clinical utility.

Materials and methods

Search strategy

Multiple electronic databases were searched up to November 2025: (search date: November 29) PubMed, Embase, Web of Science and Cochrane Library. Only randomized controlled trials (RCTs) were included in this systematic review and meta-analysis to minimize the risk of bias and ensure the highest level of evidence. The detailed search can be found in supplementary *table I* (addendum). The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines were followed (19).

Selection criteria

The following inclusion criteria were applied:

1. The study design is an RCT.
2. Studies evaluated the effect of any type of infiltration therapy for plantar fasciitis.
3. Outcomes included Visual Analog Scale (VAS) for pain and/or American Orthopaedic Foot and Ankle Society (AOFAS) score for foot function.
4. Studies were published in English or Dutch.

The exclusion criteria were:

1. Case reports, case series, observational studies, quasi-experimental trials, pilot studies, editorial studies, conference abstracts and clinical commentary articles
2. Studies for which data were only available in abstract form.
3. Studies including patients younger than 16 years of age.
4. Studies including patients who had received prior treatment for plantar fasciitis, such as previous infiltrations, ESWT, or surgery, before the investigated intervention.

Quality assessment

The assessment of quality of the included studies has been evaluated using the Cochrane criteria Risk of Bias tool version 2.0 (20). The risk of bias assessment was carried out by two independent reviewers (R.V. and J.C.), with disagreements resolved through discussion. Following domains were assessed for each study: randomization process, deviations from intended interventions, missing outcome data, measurement of the outcome, selection of the reported result, and overall bias. The potential risk of bias was categorized as low, moderate or high.

Data extraction and analysis

Two reviewers (R.V. and J.C.) independently screened titles and abstracts according to the predefined inclusion criteria. Articles deemed potentially eligible were subsequently assessed in full text. If any discrepancies existed between the two reviewers, these were resolved through discussion in order to reach a consensus decision.
Once full-text screening was completed, the following data was independently extracted by two researchers: first author, year of publication, type of injection (intervention), number of participants, age, follow-up periods and outcome (VAS and AOFAS). The extracted data were then compared between the two researchers to identify and resolve any discrepancies, thereby minimizing errors.

For the qualitative synthesis/meta-analysis component of this study, only RCTs directly comparing PRP with CS injections were included, provided they were methodologically and clinically comparable, meaning that the studies had similar patient populations, interventions, outcome measures, and follow-up durations The primary outcome measure was the VAS score for pain. The AOFAS score was used as the secondary outcome for combining subjective and objective data. Follow-up durations were categorized into intermediate-term (3 months or 12 weeks) and long-term (6 months or 24 weeks) outcomes. Statistical analyses were conducted using Meta-Essentials software. A random-effects model was applied to account for potential between-study variability. Statistical heterogeneity among the included studies was assessed using Cochran's Q statistic and the I^2 statistic. A p-value of $< .05$ was considered statistically significant.

Results

Search results

The initial search identified 3148 potential articles, of which 1072 duplicates were removed. After screening the remaining 2076 articles based on title and abstract, 1964 articles were excluded as they did not meet the inclusion criteria. Full-text screening was performed on the remaining 112 articles, of which 88 were excluded. A total of 24 articles remained and were included for this systematic review and meta-analysis. The PRISMA flow diagram, including the reasons for exclusion during the final full-text screening, is presented in *Figure 1*.

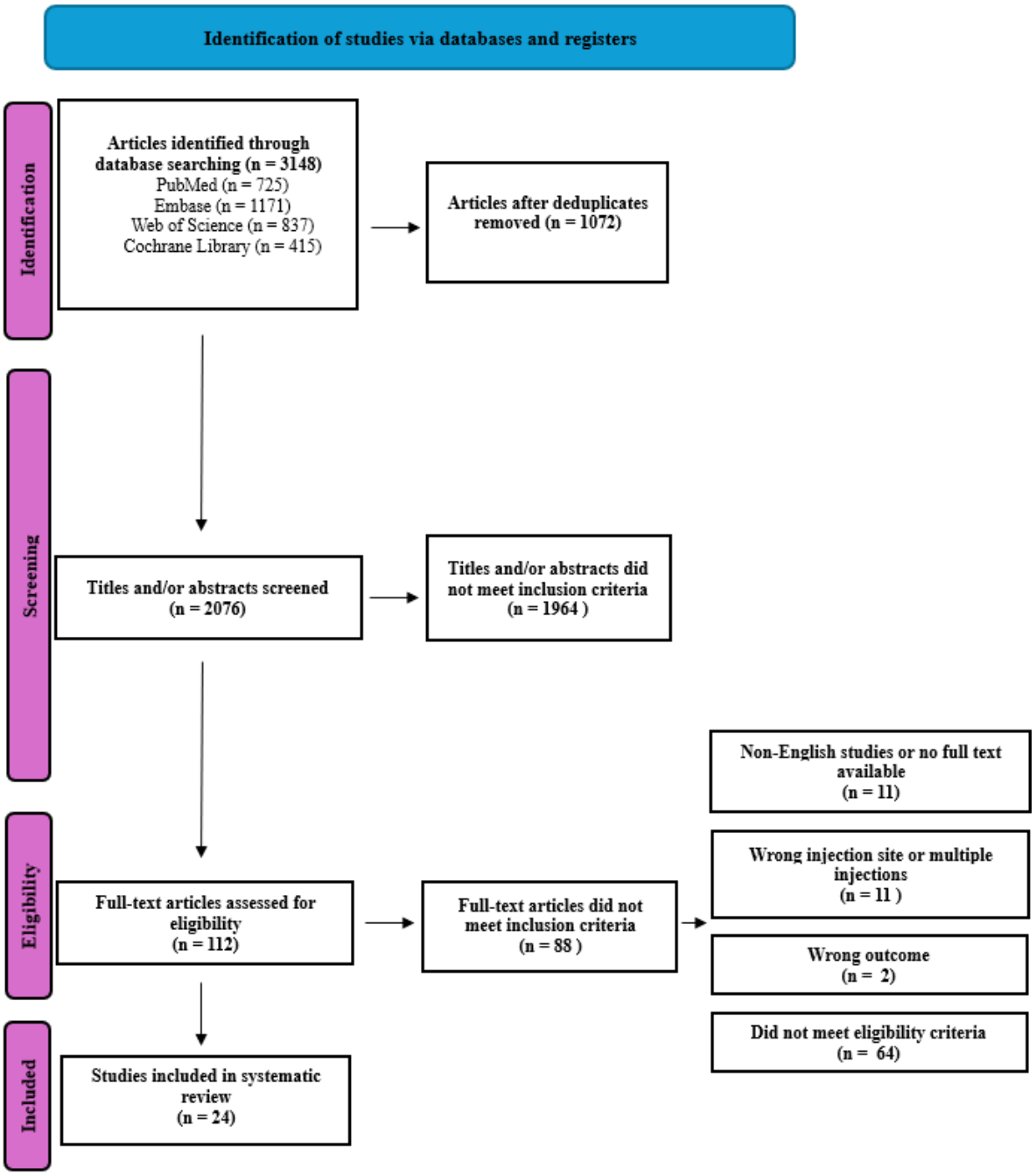


Figure 1. *PRISMA flow diagram of study selection*

Bias Assessment

Several studies demonstrated low risk of bias across multiple domains, particularly for outcome measurement and completeness of outcome data. However, many RCTs were rated as having some concerns, mainly due to limited reporting of the randomization process and allocation concealment.

The domain selection of the reported result (Domain 5) most frequently raised concerns, largely because statistical analysis plans or study protocols were not available, making it difficult to determine whether selective reporting had occurred.

Four studies were classified as having high risk of bias, primarily due to insufficient reporting of methodological procedures, including inadequate description of the randomization process, lack of blinding, and incomplete reporting of outcome data. Consequently, the overall risk of bias across included studies was considered low to moderate.

The detailed assessment for each domain is presented in *table 1.*

Table 1. Summary of risk of bias assessment (tool 2):

Study	D1 Randomization process	D2 Deviations from intended interventions	D3 Missing outcome data	D4 Measurement of the outcome	D5 Selection of the reported result	Overall risk bias
Atzmon R. et al (21)	+	?	+	?	?	?
Acosta-Olivo et al (22)	?	+	?	+	?	?
Bahrami M. et al (23)	+	?	?	+	?	?
Chakravarth H. Y. et al (24)	?	?	+	?	?	?
Elizondo-Rodriguez J. et al (25)	+	+	+	+	?	?
Haddad S. et al (26)	?	?	+	?	?	?
Hocaoglu S. et al (27)	+	+	+	+	?	?
Khobragade A. S. et al (28)	-	?	+	?	?	-
Lai T.W. et al (29)	?	+	+	?	?	?
Li S.M. et al (30)	+	?	?	?	?	?
Malahias M.A. et al (31)	+	+	+	+	?	?
Mardani-Kivi M. et al (32)	?	-	-	+	?	-
Monto R.R. et al (9)	?	?	+	+	+	?
Orhan O. et al (33)	-	+	+	?	?	-
Porter M.D. et al (34)	+	+	+	?	?	?
Raeissadat S.A. et al (35)	+	+	?	+	?	?
Roca B. et al (36)	?	?	+	?	?	?
Sathyendra K.G. et al (37)	?	?	+	?	?	?
Sawan Z.H. et al (38)	?	+	+	+	?	?
Sharma G. et al (39)	-	?	?	?	?	-
Teymouri A. et al (40)	+	+	+	+	?	?
Tiwari M. et al (41)	?	?	+	?	?	?
Yucel I. et al (42)	?	?	+	?	?	?
Yucel U. et al (43)	+	+	+	?	?	?

Characteristics of included studies

A total of 24 RCTs were included in the narrative synthesis. Sample sizes ranged from approximately 30 to 128 participants, and the mean age of patients varied widely between 37 and 59 years, although the overall age range across studies extended from about 20 to 85 years. The characteristics of the included studies and their population can be found in *table 2*.

The most frequently investigated intervention was CS injection, including methylprednisolone, triamcinolone, and betamethasone. Several studies evaluated autologous blood–derived products, particularly PRP. Other injectable therapies investigated included hyaluronic acid, botulinum toxin A, ozone therapy, dextrose prolotherapy, local anesthetic injections, and normal saline.

Follow-up periods varied considerably across studies, ranging from 2 weeks to 24 months, with most trials reporting outcomes at 3 and 6 months. The primary outcome measure was typically pain reduction assessed by the VAS, while several studies also reported functional outcomes using the AOFAS score.

For the quantitative meta-analysis, only a subset of the included RCTs was selected. Specifically, studies were included if they directly compared PRP with CS injections and reported sufficient quantitative data (mean, standard deviation, and sample size) for the predefined outcomes at comparable follow-up time points. Based on these criteria, a limited number of studies were deemed eligible for each outcome and time point. Six trials directly compared PRP with CS injections and provided sufficient data for inclusion in the meta-analysis of VAS scores at 3 months, while five studies were available for the VAS analysis at 6 months. Four studies reported AOFAS scores at 3 months and three studies at 6 months, and were therefore included in the respective meta-analyses.

Table 2. Summary of characteristics of the included studies

Study	Type of injection	Sample size	Intervention	Age group*	Follow-up period	Outcome
Acosta-Olivo et al (2017)	CS	15	8 mg of dexamethasone with 2 mL of lidocaine	44.8 (range, 24–61)	2, 4, 8, 12, 16 wks	VAS, AOFAS
	ABP	15	3 mL PRP with 2 mL lidocaine	44.8 (range, 24–61)	2, 4, 8, 12, 16 wks	VAS, AOFAS
Atzmon R. et al (2022)	ABP	16	4 mL PRP	54.7 ± 14	3, 6, 12 mo	VAS
Bahrami M. et al (2019)	CS	25	40 mg methylprednisolone with 1 mL of 2% lidocaine	/	1, 4, 12 wks	VAS
	Ozone	25	3 mL ozone gas (15 µg/mL) with 1 mL of lidocaine 2%	/	1, 4, 12 wks	VAS
Chakravarth H. Y. et al (2024)	ABP	40	1 mL PRP	43.6 ± 8.02	12 wks; 6 mo	VAS
	CS	40	Triamcinolone with 1 mL 2% lignocaine	41.48 ± 9.14	12 wks; 6 mo	VAS
	NS	40	Normal Saline	43.75 ± 9.03	12 wks; 6 mo	VAS
Elizondo-Rodriguez J. et al (2021)	LA	26	5 mL of ropivacaine	49.3 ± 10.6	2 wks; 1, 3, 6 mo	VAS
	CS	26	1 mL betamethasone sodium phosphate	46.4 ± 11.0	2 wks; 1, 3, 6 mo	VAS
	BT	26	200 U of BoNT-A in a total volume of 2 mL	44.0 ± 12.5	2 wks; 1, 3, 6 mo	VAS
Haddad S. et al (2021)	ABP	50	3 mL PRP with 2 ml of lidocaine	44.58 ± 4.3	2, 4, 8, 16, 24 wks	VAS
Hocaoglu S. et al (2017)	CS	36	1 mL of betamethasone sodium plus 0.5 mL of prilocaine	47.86 ± 7.90	1, 3, 6 mo	VAS
Khobragade A. S. et al (2024)	ABP	33	PRP (mL unknown)	/	2, 6, 12 wks	VAS
Lai T.W. et al (2018)	CS	50	20 mg triamcinolone acetonite with 2 ml of 2% xylocaine	54.58 ± 8.63	4, 12 wks	VAS
Li S.M. et al (2014)	CS	25	20 mg triamcinolone acetonide with 2 mL of 2% lidocaine	56.93 ± 9.25	1, 6, 12 mo	VAS
Malahias M.A. et al (2019)	ABP	18	PRP (mL unkown) with 4 mL of lidocaine	/	3, 6 mo	VAS
		18	PPP (mL unkown) with 4 mL of lidocaine	/	3, 6 mo	VAS
Mardani-Kivi M. et al (2015)	CS	41	40 mg methyl prednisolone acetate with 1 mL of lidocaine 2%	44.68 ± 9.20	3, 6, 12 wks	VAS
Monto R.R. et al (2014)	CS	20	40 mg methylprednisolone	59 (range, 24-74)	3, 6, 12, 24 mo	AOFAS
	ABP	20	3 mL PRP	51 (range, 21-67)	3, 6, 12, 24 mo	AOFAS

Orhan O. et al (2023)	CS	22	40 mg methylprednisolone	37.1 ± 9.1 (range, 22-52)	6 wks; 3, 6 mo	VAS, AOFAS
Porter M.D. et al (2005)	CS	64	5;7 mg betamethasone with 2 mL of lignocaine 1%	39.9 (range, 21–80)	3, 12 mo	VAS
Raeissadat S.A. et al (2020)	CS	29	40 mg methylprednisolone with 1 mL of lidocaine 2%	40.33 ± 10.17	6, 24 wks	VAS
	HA	31	1 mL HMW Hyaluron Acid with 1 mL of lidocaine 2%	41.73 ± 7.68	6, 24 wks	VAS
Roca B. et al (2016)	BT	36	100 U BoNT-A with 1mL saline	54.4 ± 13.3	1-2 mo	VAS
Sathyendra K.G. et al (2023)	CS	35	40 mg methylprednisolone acetate with 1 mL of 2% lidocaine	20 – 60 (range)	15 d; 1, 3, 6 mo	VAS, AOFAS
	ABP	35	3 mL PRP	20 – 60 (range)	15 d; 1, 3, 6 mo	VAS, AOFAS
Sawan Z.H. et al (2023)	CS	30	40 mg methylprednisolone with 1 ml of xylocaine 2%	44.4 ± 7.36	3, 6, 12 wks; 6 mo	VAS, AOFAS
	ABP	30	2.5 ml of PRP mixed with 2.5% of calcium chloride (CaCl2)	46.67 ± 6.33	3, 6, 12 wks; 6 mo	VAS, AOFAS
Sharma G. et al (2024)	CS	25	40 mg of methylprednisolone with 1 ml of 2% lignocaine	42.29 ± 8.0	1, 3, 6 mo	VAS
	ABP	25	3 mL of pure PRP	42.31 ± 7.6	1, 3, 6 mo	VAS
Teymouri A. et al (2024)	CS	19	40 mg of methylprednisolone acetate with 1 mL of lidocaine 2%	48.2 ± 6.2	1, 3 mo	VAS
	PT	19	1 mL of dextrose 50% solution with 1 mL of lidocaine 2%	48.8 ± 5.9	1, 3 mo	VAS
Tiwari M. et al (2013)	CS	30	40 mg methylprednisolone with lidocaine 2%	30 - 85 (range)	1, 3, 6 mo	VAS
	ABP	30	5 mL PRP	31 - 85 (range)	1, 3, 6 mo	VAS
Yucel I. et al (2010)	CS	33	1.6 mg betamethasone dipropionate and 0.6 mg betamethasone sodium phosphate with 0.5 mL of 2% prilocaine hydrochloride	44.7 ± 9.20	3 mo	VAS
Yucel U. et al (2013)	CS	22	3.2 mg betamethasone dipropionate and 1.3 mg betamethasone sodium phosphate with 1 mL of lidocaine HCl	45.6 ± 9.3	1 mo	VAS

ABP = autologous blood-derived products; CS = corticosteroid; BT = Botulinum toxin; PT = prolotherapy; HA = hyaluronic acid; NS = normal saline; AOFAS = American Orthopaedic Foot and Ankle Score; PRP = platelet-rich plasma; VAS = Visual Analog Scale; wk(s) = week(s); mo = month(s)

Note: Only data from injection-based interventions were extracted and reported in this table. In studies including additional control or comparison groups not relevant to the scope of this review, those results were not included.

** Age is reported as presented in the original studies and may be expressed as mean ± standard deviation or as median with range.*

Narrative synthesis

Pain Visual Analog Scale

Pain reduction assessed using the VAS was the most frequently reported outcome among the included studies. All studies reported mean VAS scores, whereas Chakravarth et al. (24) presented results as percentages across pain categories. The detailed results are summarized in *Table 3*.

Across the included RCTs, all injection therapies were associated with reductions in VAS scores compared with baseline values. CS injections generally resulted in a rapid decrease in pain during the early follow-up period. For example, Acosta-Olivo et al. (22) reported a reduction in VAS scores from 5.67 ± 1.54 at baseline to 0.53 ± 1.06 at 12 weeks following CS injection. Similar short-term improvements were observed in several other studies evaluating CS injections. However, the study by Sawan Z.H. et al. (38) did not show a decrease in pain following CS injection, with VAS scores changing from 5.4 ± 0.65 at baseline to 5.63 ± 1.25 at 12 weeks.

Autologous blood-derived products (ABP), particularly PRP, also demonstrated reductions in pain scores. The majority of trials reported a gradual decrease in VAS scores during follow-up after PRP injection. In the study by Malahias M.A. et al. (31), pain scores following platelet-poor plasma (PPP) injection showed no further improvement after 6 months. In most studies, these improvements were maintained over longer follow-up periods compared with CS injections (*Table 3*).

In addition to CS and PRP injections, several studies evaluated other injectable therapies, including botulinum toxin A, hyaluronic acid, prolotherapy, ozone therapy, and local anesthetic injections. Botulinum toxin A was investigated by Elizondo-Rodriguez et al. and Roca et al., hyaluronic acid by Raeissadat et al., prolotherapy by Teymouri et al., and ozone therapy by Bahrami et al. (23, 25, 35, 36, 40). These studies also reported reductions in VAS scores during follow-up.

Table 3. Summary of results (VAS) of the included studies

Study	Type of injection	Follow-up	VAS – score*
Acosta-Olivo et al (2017)	CS	Pretreatment	5.67 ± 1.54
		2 weeks	3.33 ± 1.67
		4 weeks	2.21 ± 1.69
		8 weeks	1.27 ± 1.53
		12 weeks	0.53 ± 1.06
		16 weeks	0.47 ± 1.34
	ABP	Pretreatment	4.53 ± 1.12
		2 weeks	3.33 ± 1.04
		4 weeks	2.42 ± 1.45
		8 weeks	1.13 ± 1.33
		12 weeks	0.62 ± 0.73
		16 weeks	0.33 ± 0.72
Atzmon R. et al (2022)	ABP	Pretreatment	8.70 ± 1.6
		3 months	3.47 ± 2.3
		6 months	2.80 ± 2.7
		12 months	2.40 ± 2.8
Bahrami M. et al (2019)	CS	Pretreatment	7.3 ± 1.4
		1 week	4.3 ± 1.8
		4 weeks	3.3 ± 1.9
		12 weeks	3.0 ± 1.1
	Ozone	Pretreatment	7.4 ± 1.5
		1 week	7.6 ± 1.5
		4 weeks	4.4 ± 1.1
		12 weeks	3.1 ± 1.5
Chakravarth H. Y. et al (2024)	ABP	Pretreatment	100% 7-10
		12 weeks	45% 1-3, 55% 4-6
		6 months	70% 0, 30% 1-3
	CS	Pretreatment	100% 7-10
		12 weeks	40% 1-3, 55% 4-6, 5% 7-10
		6 months	25% 0, 37,5% 1-3, 37,5% 4-6
	NS	Pretreatment	100% 7-10
		12 weeks	87.5% 4-6, 12,5% 7-10
		6 months	20% 1-3, 55% 4-6, 25% 7-10
Elizondo-Rodriguez J. et al (2021)	LA	Pretreatment	7.6 ± 0.26
		2 weeks	5.7 ± 0.40
		1 month	4.6 ± 0.62
		3 months	3.4 ± 0.51
		6 months	2.1 ± 0.33
	CS	Pretreatment	7.8 ± 0.41
		2 weeks	5.1 ± 0.39
		1 month	5.0 ± 0.51
		3 months	3.9 ± 0.49
		6 months	2.6 ± 0.53
	BT	Pretreatment	8.0 ± 0.33
		2 weeks	5.6 ± 0.55
		1 month	4.6 ± 0.61
		3 months	3.4 ± 0.58
		6 months	2.5 ± 0.58

Haddad S. et al (2021)	ABP	Pretreatment 2 weeks 4 weeks 8 weeks 16 weeks 24 weeks	6.23 ± 1.4 5.40 ± 1.1 4.67 ± 1.2 3.20 ± 1.1 2.87 ± 0.8 1.40 ± 0.8
Hocaoglu S. et al (2017)	CS	Pretreatment 1 month 3 months 6 months	9 (range 5-10) 4 (range 1-7) 4 (range 1-8) 4 (range 1-6)
Khobragade A. S. et al (2024)	ABP Conservative	Pretreatment 2 weeks 6 weeks 12 weeks Pretreatment 2 weeks 6 weeks 12 weeks	5.4 ± 0.56 3.4 ± 0.97 2.7 ± 0.78 2.3 ± 0.91 5.4 ± 0.59 3.3 ± 0.80 2.9 ± 0.82 2.2 ± 0.80
Lai T.W. et al (2018)	CS	Pretreatment 4 weeks 12 weeks	6.24 ± 1.10 4.10 ± 0.81 2.98 ± 0.84
Li S.M. et al (2014)	CS	Pretreatment 1 month 6 months 12 months	7.33 ± 2.09 4.03 ± 2.37 6.32 ± 2.64 6.48 ± 2.70
Malahias M.A. et al (2019)	ABP: PRP ABP: PPP	Pretreatment 3 months 6 months Pretreatment 3 months 6 months	7.4 ± 1.79 4.2 ± 2.92 2.9 ± 3.44 6.9 ± 1.97 3.8 ± 3.17 4.3 ± 3.7
Mardani-Kivi M. et al (2015)	CS	Pretreatment 3 weeks 6 weeks 12 weeks	8.8 ± 1.3 2.3 ± 3.2 2.2 ± 3.5 3.4 ± 3.7
Orhan O. et al (2023)	CS Conservative	Pretreatment 6 weeks 3 months 6 months Pretreatment 6 weeks 3 months 6 months	8.03 ± 0.96 1.17 ± 1.78 2.13 ± 1.80 2.07 ± 2.13 7.63 ± 1.21 2.60 ± 1.47 1.93 ± 1.36 2.27 ± 1.11
Porter M.D. et al (2005)	CS Conservative	Pretreatment 3 months 12 months Pretreatment 3 months 12 months	5.47 (2–8) 1.48 (0–7) 0.84 (0–7) 5.47 (3–7) 3.58 (2–5) 2.42 (1–4)
Raeissadat S.A. et al (2020)	CS	Pretreatment 6 weeks 24 weeks	7.77 ± 1.06 2.40 ± 2.16 3.49 ± 1.93

	HA	Pretreatment 6 weeks 24 weeks	8.00 ± 1.35 3.05 ± 2.33 3.24 ± 2.24
Roca B. et al (2016)	BT	Pretreatment 1-2 months	7 (6–8) 0 (0–2)
Sathyendra K.G. et al (2023)	CS	Pretreatment 15 days 1 month 3 months 6 months	7.49 ± 1.2 7.09 ± 0.98 6.69 ± 0.87 6.2 ± 0.72 5.4 ± 0.65
	ABP	Pretreatment 15 days 1 month 3 months 6 months	7.66 ± 1 7.03 ± 0.79 6.26 ± 0.7 5.37 ± 0.69 3.71 ± 0.67
Sawan Z.H. et al (2023)	CS	Pretreatment 3 weeks 6 weeks 12 weeks 6 months	5.4 ± 0.65 4.1 ± 1.37 4.8 ± 1.61 5.63 ± 1.25 5.97 ± 1.1
	ABP	Pretreatment 3 weeks 6 weeks 12 weeks 6 months	7.87 ± 0.63 6.13 ± 0.9 4.4 ± 1.33 3.23 ± 2.19 3.5 ± 2.16
Sharma G. et al (2024)	CS	Pretreatment 1 month 3 months 6 months	8.0 ± 0.8 5.29 ± 0.8 4.82 ± 0.7 4.12 ± 1.2
	ABP	Pretreatment 1 month 3 months 6 months	8.2 ± 0.6 6.18 ± 1.2 3.05 ± 0.6 1.67 ± 0.8
Teymouri A. et al (2024)	CS	Pretreatment 1 month 3 months	7.89 ± 1.19 3.78 ± 0.19 4.63 ± 1.11
	PT	Pretreatment 1 month 3 months	7.73 ± 1.28 7.15 ± 1.21 3.21 ± 1.03
Tiwari M. et al (2013)	CS	Pretreatment 1 month 3 months 6 months	6.03 (0.85) 2.7 (0.75) 2.8 (0.76) 2.8 (0.76)
	ABP	Pretreatment 1 month 3 months 6 months	5.9 (0.76) 2.1 (1.0) 2.0 (0.45) 2.0 (0.45)
Yucel I. et al (2010)	CS	Pretreatment 3 months	5.1 ± 2.10 1.1 ± 0.90
Yucel U. et al (2013)	CS	Pretreatment	6.45 ± 1.23

		1 month	3.70 ± 1.45
	Conservative	Pretreatment	6.95 ± 0.94
		1 month	4.65 ± 1.34

ABP = autologous blood-derived products; CS = corticosteroid; BT = Botulinum toxin; PT = prolotherapy; HA = hyaluronic acid; NS = normal saline; PRP = platelet-rich plasma; PPP = platelet-poor plasma; VAS = Visual Analog Scale

* VAS scores are reported as presented in the original studies and may be expressed as mean ± standard deviation, median (range), or as categorical distributions.

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Secondary outcomes assessed using the AOFAS score were reported in several of the included studies. Detailed results are summarized in *Table 4*.

Across the included RCTs, all injection therapies were associated with increases in AOFAS scores compared with baseline values, indicating improved foot function.

CS injections demonstrated improvements in functional scores during follow-up. For example, Acosta-Olivo et al. (22) reported an increase in AOFAS scores from 67.6 ± 10.7 at baseline to 96.8 ± 5.4 at 12 weeks following CS injection. Similar improvements were observed in other studies evaluating CS injections.

Autologous blood-derived products, particularly PRP, also demonstrated improvements in functional outcomes. In the majority of trials AOFAS scores increased during follow-up after PRP injection. In the study by Monto et al. (9), AOFAS scores in the CS group declined after the initial improvement, whereas the PRP group maintained higher functional scores during follow-up (*Table 4*).

Table 4. Summary of results (AOFAS) of the included studies

Study	Type of injection	Follow-up	AOFAS – score*
Acosta-Olivo et al (2017)	CS	Pretreatment	67.6 ± 10.7
		2 weeks	82.6 ± 9.7
		4 weeks	86.8 ± 9.8
		8 weeks	91.4 ± 10.0
		12 weeks	96.8 ± 5.4
		16 weeks	97.2 ± 8.4
	ABP	Pretreatment	72.3 ± 9.1
		2 weeks	80.8 ± 6.0
		4 weeks	85.9 ± 6.7
		8 weeks	96.1 ± 10.1
		12 weeks	94.4 ± 5.7
		16 weeks	96.2 ± 6.0
Monto R.R. et al (2014)	CS	Pretreatment	52 (range, 24 to 60)
		3 months	81 (range, 56 to 90)
		6 months	74 (range, 54 to 87)
		12 months	58 (range, 45 to 77)
		24 months	56 (range, 30 to 75)
	ABP	Pretreatment	37 (range, 30 to 56)
		3 months	95 (range, 88 to 100)
		6 months	94 (range, 87 to 100)
		12 months	94 (range, 86 to 100)
		24 months	92 (range, 77 to 100)
Orhan O. et al (2023)	CS	Pretreatment	39.03 ± 2.67
		6 weeks	42.77 ± 8.11
		3 months	47.23 ± 4.05
		6 months	46.03 ± 6.40
	Conservative	Pretreatment	30.40 ± 6.5
		6 weeks	41.97 ± 5.47
		3 months	44.23 ± 4.04
		6 months	43.10 ± 4.88
Sathyendra K.G. et al (2023)	CS	Pretreatment	64 ± 8.12
		15 days	65.14 ± 8.87
		1 month	68 ± 9.94
		3 months	72.57 ± 9.8
		6 months	79.43 ± 3.38
	ABP	Pretreatment	62.86 ± 7.1
		15 days	62.86 ± 7.1
		1 month	72.57 ± 9.8
		3 months	79.43 ± 3.38
		6 months	84 ± 4.97
Sawan Z.H. et al (2023)	CS	Pretreatment	47.87 ± 5.96
		3 weeks	77.97 ± 11.88
		6 weeks	74.67 ± 13.31
		12 weeks	68.20 ± 11.42
		6 months	63.60 ± 9.72
	ABP	Pretreatment	47.47 ± 5.62
		3 weeks	63.37 ± 7.62
		6 weeks	77.80 ± 10.63
		12 weeks	85.30 ± 15.15

		6 months	83.67 ± 15.91

ABP = autologous blood-derived products; CS = corticosteroid; AOFAS = American Orthopaedic Foot and Ankle Score;

* AOFAS scores are reported as presented in the original studies and may be expressed as mean ± standard deviation or median (range).

Meta-analysis results

A limited number of RCTs, directly comparing PRP with CS injections, were included in the quantitative meta-analysis (*Table 5-8*). Pain outcomes were assessed using the VAS score at 3 and 6 months, while functional outcomes were evaluated using the AOFAS score at the same follow-up intervals.

Overall, the pooled analyses suggested larger treatment effects favouring PRP, particularly at 6 months, where a statistically significant reduction in pain was observed. However, the analyses demonstrated considerable heterogeneity between studies, and several pooled estimates did not reach statistical significance. These findings will be explored and interpreted in more detail in the following sections.

Pain outcomes (VAS)

VAS at 3 months

Six RCTs comparing PRP with CS injections were included in the meta-analysis of VAS scores at 3 months, comprising a total of 350 participants. The extracted data of the included studies are presented in *Table 5*, and the pooled meta-analysis is illustrated in the forest plot (*Figure 2*).

The pooled analysis using a random-effects model demonstrated a large pooled effect size favouring PRP, with a Hedges' g of 1.02 (95% CI −0.07 to 2.10). However, the confidence interval crossed zero, indicating that the difference between PRP and CS injections did not reach statistical significance at the 3-month follow-up.

Considerable heterogeneity was observed among the included studies ($Q = 55.53$, $p < 0.001$; $I^2 = 91\%$), suggesting substantial variability in treatment effects across the trials.

VAS at 6 months

Five RCTs comparing PRP with CS injections were included in the meta-analysis of VAS scores at 6 months, comprising a total of 320 participants. The extracted data of the included studies are presented in *Table 6*, and the pooled meta-analysis is illustrated in the forest plot (*Figure 3*).

The pooled analysis using a random-effects model demonstrated a large pooled effect size favouring PRP, with a Hedges' g of 1.82 (95% CI 1.12 to 2.52). As the confidence interval did not cross zero, the difference between PRP and CS injections was statistically significant, indicating greater pain reduction following PRP injection at the 6-month follow-up.

Moderate to substantial heterogeneity was observed among the included studies ($Q = 13.32$, $p = 0.0098$; $I^2 = 70\%$), indicating variability in treatment effects across studies.

Positive effect sizes indicate lower VAS scores in the PRP group compared with the CS group.

Table 5. Results VAS 3 months

	Study	Mean 1 (PRP)	Mean 2 (CS)	SD 1 (PRP)	SD 2 (CS)	N1 (PRP)	N2 (CS)
1.	Acosta-Olivo et al	0.62	0.53	0.73	1.06	15	15
2.	Chakravarth H.Y. et al	4.18	4.03	1.05	1.21	40	40
3.	Sathyendra K.G. et al	5.37	6.20	0.69	0.72	35	35
4.	Sawan Z.H. et al	3.23	5.63	2.19	1.25	30	30
5.	Sharma G. et al	3.05	4.82	0.60	0.70	25	25
6.	Tiwari M. et al	2.00	2.80	0.45	0.76	30	30

CS = corticosteroid; PRP = platelet-rich plasma; VAS = Visual Analog Scale; M = mean VAS; S = standard deviation; N = number of participants

Table 6. Results VAS 6 months

	Study	Mean 1 (PRP)	Mean 2 (CS)	SD 1 (PRP)	SD 2 (CS)	N1 (PRP)	N2 (CS)
1.	Chakravarth H.Y. et al	0.36	2.70	0.58	1.90	40	40
2.	Sathyendra K.G. et al	3.71	5.40	0.67	0.65	35	35
3.	Sawan Z.H. et al	3.50	5.97	2.16	1.10	30	30
4.	Sharma G. et al	1.67	4.12	0.80	1.20	25	25
5.	Tiwari M. et al	2.00	2.80	0.45	0.76	30	30

CS = corticosteroid; PRP = platelet-rich plasma; VAS = Visual Analog Scale; M = mean VAS; S = standard deviation; N = number of participants

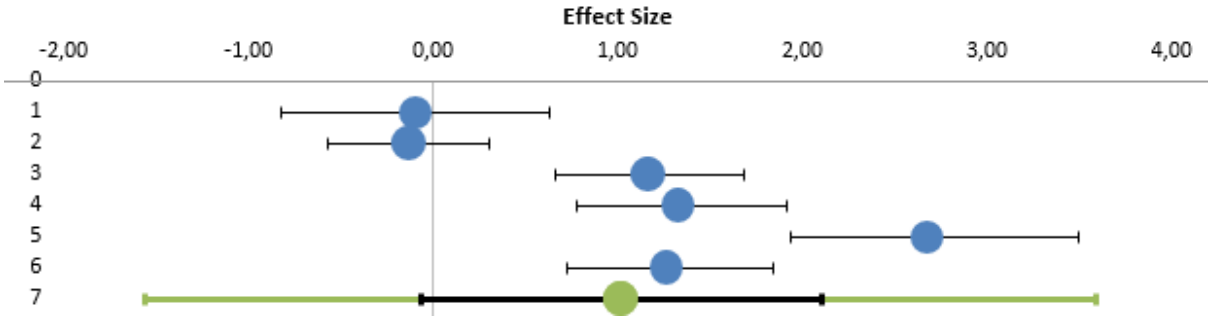


Figure 2. *Forest plot of Visual Analog Scale (VAS) reduction comparing autologous blood-derived products (ABP) to corticosteroid (CS) (3 months). Full numerical results are provided in supplementary table II (addendum).*

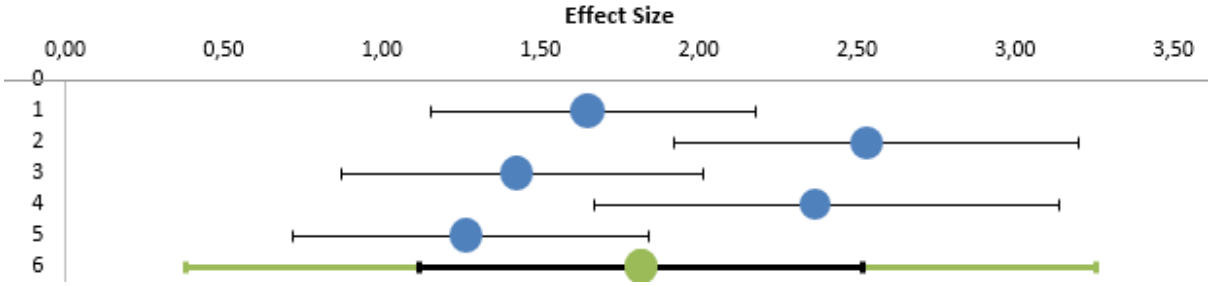


Figure 3. *Forest plot of Visual Analog Scale (VAS) reduction comparing autologous blood-derived products (ABP) to corticosteroid (CS) (6 months). Full numerical results are provided in supplementary table II (addendum).*

Functional outcomes (AOFAS)

AOFAS at 3 months

Four RCTs comparing PRP with CS injections were included in the meta-analysis of AOFAS scores at 3 months, comprising a total of 200 participants. The extracted data of the included studies are presented in *Table 7*, and the pooled meta-analysis is illustrated in the forest plot (*Figure 4*).

The pooled analysis using a random-effects model demonstrated a large pooled effect size favouring PRP, with a Hedges' g of −0.97 (95% CI −2.64 to 0.69). However, the confidence interval crossed zero, indicating that the difference between PRP and CS injections did not reach statistical significance at the 3-month follow-up.

Considerable heterogeneity was observed among the included studies ($Q = 25.15$, $p < 0.001$; $I^2 = 88\%$), suggesting substantial variability in treatment effects across the trials.

Negative effect sizes indicate higher AOFAS scores in the PRP group compared with the CS group, reflecting greater functional improvement following PRP treatment.

AOFAS at 6 months

Three RCTs comparing PRP with CS injections were included in the meta-analysis of AOFAS scores at 6 months, comprising a total of 170 participants. The extracted data of the included studies are presented in *Table 8*, and the pooled meta-analysis is illustrated in the forest plot *(Figure 5)*.

The pooled analysis using a random-effects model demonstrated a large pooled effect size favouring PRP, with a Hedges' g of −1.82 (95% CI −4.41 to 0.77). However, as the confidence interval crossed zero, the difference between PRP and CS injections did not reach statistical significance at the 6-month follow-up.

Considerable heterogeneity was observed among the included studies ($Q = 14.85$, $p < 0.001$; $I^2 = 87\%$), indicating substantial variability in treatment effects across studies.

Negative effect sizes indicate higher AOFAS scores in the PRP group compared with the CS group, reflecting greater functional improvement following PRP treatment.

Table 7. Results AOFAS 3 months

	Study	Mean 1 (PRP)	Mean 2 (CS)	SD 1 (PRP)	SD 2 (CS)	N1 (PRP)	N2 (CS)
1.	Acosta-Olivo et al	94.40	96.80	5.70	5.40	15	15
2.	Monto R.R. et al	95.00	81.00	3.00*	8.50*	20	20
3.	Sathyendra K.G. et al	79.43	72.57	3.38	9.80	35	35
4.	Sawan Z.H. et al	85.30	68.20	15.15	11.42	30	30

CS = corticosteroid; PRP = platelet-rich plasma; AOFAS = American Orthopaedic Foot and Ankle Score; M = mean AOFAS; S = standard deviation; N = number of participants

*Standard deviations were not reported in the original article and were estimated using established statistical methods (42, 43).

Table 8. Results AOFAS 6 months

	Study	Mean 1 (PRP)	Mean 2 (CS)	SD 1 (PRP)	SD 2 (CS)	N1 (PRP)	N2 (CS)
1.	Monto R.R. et al	94.00	74.00	3.30*	8.30*	20	20
2.	Sathyendra K.G. et al	84.00	79.43	4.97	3.38	35	35
3.	Sawan Z.H. et al	83.67	63.60	15.91	9.72	30	30

CS = corticosteroid; PRP = platelet-rich plasma; AOFAS = American Orthopaedic Foot and Ankle Score; M = mean AOFAS; S = standard deviation; N = number of participants

*Standard deviations were not reported in the original article and were estimated using established statistical methods (44, 45).

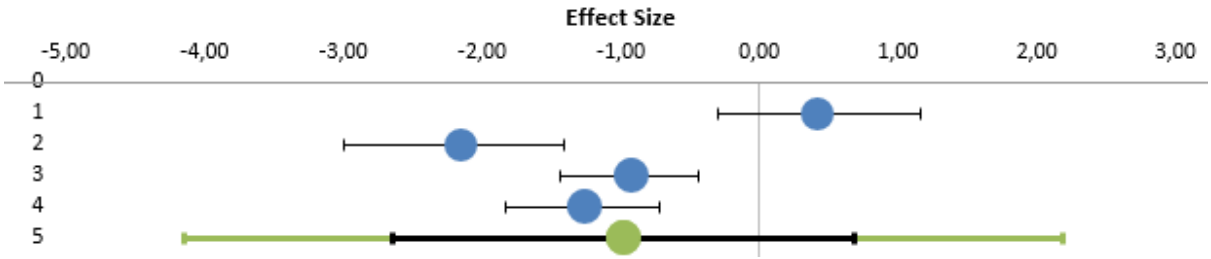


Figure 4. *Forest plot of American Orthopaedic Foot and Ankle Score (AOFAS) comparing autologous blood-derived products (ABP) to corticosteroid(CS) (3 months). Full numerical results are provided in supplementary table II (addendum).*

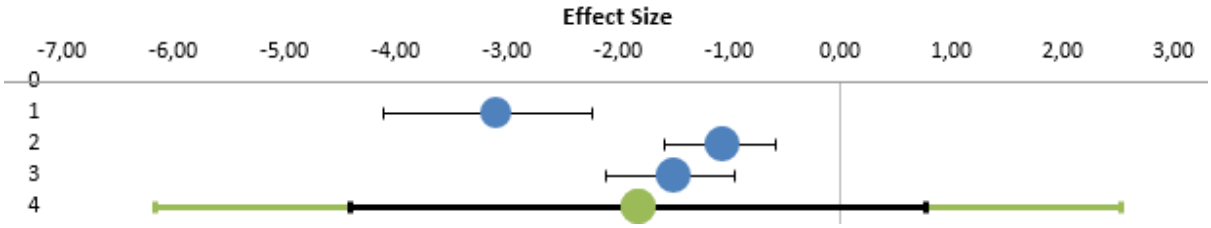


Figure 5. *Forest plot of American Orthopedic Foot and Ankle Score (AOFAS) comparing autologous blood-derived products (ABP) to corticosteroid(CS) (6 months). Full numerical results are provided in supplementary table II (addendum).*

Discussion

The present systematic review and meta-analysis evaluated the effectiveness of different injection therapies for plantar fasciitis, with a specific quantitative comparison between PRP and CS injections. The narrative synthesis demonstrated that most injectable treatments (including botulinum toxin, hyaluronic acid, prolotherapy, ozone therapy, and local anesthetic injections) were associated with reductions in pain and improvements in function. CS injections consistently showed a rapid decrease in pain in the short term, whereas PRP injections were associated with a more gradual but sustained improvement over time. These findings were reflected in the meta-analysis.

At the 3-month follow-up, the pooled analysis demonstrated a large effect size favouring PRP in terms of pain reduction measured by the VAS, although the difference did not reach statistical significance. Considerable heterogeneity was observed between studies, which may partly explain this finding. Variations in PRP preparation protocols, platelet concentrations, and injection techniques may influence treatment efficacy. In addition, differences in CS type, dosage, and patient characteristics such as baseline pain severity or duration of symptoms may also contribute to the observed variability in treatment effects.

At the 6-month follow-up, PRP demonstrated a statistically significant advantage over CS injections in reducing pain scores. These findings are consistent with the proposed biological mechanisms of both treatments. PRP contains high concentrations of cytokines and growth factors that stimulate cellular proliferation, angiogenesis, and tissue regeneration, thereby promoting healing of degenerative tissues such as the plantar fascia (11-13). In contrast, CS injections mainly provide anti-inflammatory and analgesic effects (7, 10).

These results are in agreement with previous studies comparing PRP and CS injections for plantar fasciitis. Singh et al. reported greater long-term pain reduction following PRP injections, while CS were associated with faster short-term symptom relief (10). Similar patterns were also observed in several RCTs included in the present review (7, 9).

Functional outcomes assessed using the AOFAS score improved following both PRP and CS injections. Although pooled analyses tended to favour PRP, these differences did not reach statistical significance. This may partly be explained by the relatively small number of studies available for functional outcome analysis. Furthermore, functional recovery may be influenced by additional factors such as biomechanical abnormalities, patient activity levels, and adherence to rehabilitation programs.

Overall, the findings of this review suggest that both PRP and CS injections can provide clinically meaningful improvements in patients with plantar fasciitis. These findings may have important clinical implications for patients with chronic or persistent plantar fasciitis. In the context of current clinical guidelines, injection therapies are generally not recommended as first-line treatment. Conservative management - including relative rest, stretching exercises, physical therapy, orthotics, and night splints - remains the cornerstone of treatment and is associated with high success rates (1, 5, 6). Injection therapies are typically reserved for patients with persistent symptoms who do not respond adequately to these initial measures. Within this framework, CS injections are often used for short-term pain relief, whereas

regenerative therapies such as PRP are increasingly considered for patients with chronic symptoms due to their potential to promote tissue healing (7, 11-13).

The findings of this review support this stepwise approach. While CS injections may be beneficial in the early phase for rapid symptom control, PRP appears to offer superior outcomes at longer follow-up intervals, suggesting a potential role in patients with prolonged or refractory plantar fasciitis. However, given the heterogeneity of the available evidence and the lack of consistent standardization in PRP protocols, these treatments should be applied with careful patient selection.

From a primary care perspective, these results highlight the importance of optimizing conservative treatment strategies before considering invasive interventions. General practitioners play a key role in early management, patient education, and guiding expectations regarding the typically self-limiting nature of the condition (4). For patients with persistent symptoms despite adequate conservative care, referral for injection therapy may be considered. In such cases, the choice of injection should be individualized: CS may be preferred when rapid pain relief is required, whereas PRP may be more appropriate for patients with chronic symptoms seeking longer-term improvement.

Future research should aim to establish standardized protocols for PRP preparation and administration, as well as to identify patient subgroups most likely to benefit from specific injection therapies.

Strengths

This systematic review and meta-analysis has several important strengths. First, a comprehensive and rigorous search strategy was applied across multiple major electronic databases ensuring a broad and representative inclusion of relevant studies. By adhering to PRISMA guidelines, methodological transparency and reproducibility were enhanced throughout the review process .

Second, only RCT's were included, which represent the highest level of evidence for evaluating treatment efficacy. This strict inclusion criterion increases the internal validity of the findings and minimizes the influence of confounding factors commonly present in observational studies .

Third, the study applied a structured approach to data extraction and quality assessment. The use of the Cochrane Risk of Bias Tool (RoB 2), performed independently by two reviewers, strengthens the reliability of the quality appraisal and reduces the risk of subjective bias .

Additionally, this study combined both narrative synthesis and meta-analysis synthesis. The meta-analysis specifically focused on direct comparisons between PRP and CS injections, allowing for a more precise evaluation of their relative effectiveness. The use of validated outcome measures such as the VAS and the AOFAS score further enhances the clinical relevance of the results .

Finally, by distinguishing between short-term and long-term outcomes, this study provides clinically meaningful insights into the temporal effects of different injection therapies. This distinction is particularly valuable for guiding treatment decisions in clinical practice, where both immediate symptom relief and sustained improvement are important considerations.

Limitations

Several limitations should be considered when interpreting the findings of this systematic review and meta-analysis. First, substantial heterogeneity was observed across the included studies, particularly in the pooled analyses of VAS and AOFAS outcomes. Differences in PRP preparation techniques, corticosteroid types, injection protocols, and follow-up durations may have influenced the pooled treatment effects.

Second, the methodological quality of several included studies raised concerns regarding potential risk of bias. In particular, incomplete reporting of randomization procedures, allocation concealment, and blinding was frequently observed. In addition, a predefined statistical analysis plan or published study protocol was rarely available for the included trials. As a result, it was often difficult to determine whether selective outcome reporting had occurred, which may increase the risk of reporting bias.

Third, the strict inclusion and exclusion criteria applied in this review may have limited the number of eligible RCTs. Only studies with comparable interventions and outcome measures

were included, resulting in a relatively small number of studies available for quantitative synthesis. This may have limited the statistical power of the meta-analysis.

Fourth, the VAS score remains a subjective measure that may be influenced by patient perception.

Finally, this meta-analysis focused primarily on direct comparisons between PRP and CS injections due to the limited number of RCTs evaluating other injectable therapies. Given the increasing number of available injection treatments for plantar fasciitis, a network meta-analysis could potentially provide additional insights by allowing indirect comparisons between multiple treatment modalities. Such an approach may help to better determine the relative effectiveness of the various injection therapies currently used in clinical practice.

Conclusion

This systematic review and meta-analysis suggests, based on the qualitative findings, that most injection therapies are associated with reductions in pain and improvements in functional outcomes in patients with plantar fasciitis. Consistent with these findings, both PRP and CS injections demonstrate clinically meaningful benefits in terms of pain relief and functional improvement. The pooled analyses indicated that PRP may provide greater long-term pain reduction compared with CS injections, particularly at the 6-month follow-up.

Although CS injections appear to offer rapid short-term symptom relief, PRP may provide more sustained clinical benefits by addressing the underlying degenerative pathology of plantar fasciopathy. Nevertheless, the available evidence remains heterogeneous, and several pooled analyses did not reach statistical significance.

Future high-quality RCTs with standardized injection protocols, larger sample sizes, and longer follow-up periods are needed to better determine the comparative effectiveness and long-term safety of injection therapies for plantar fasciitis.

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ADDENDUM

Supplementary table I. *Search entries in databases: PubMed, Embase, Web of Science, Cochrane Library*

PubMed Concept 1 "Fasciitis, Plantar"[Mesh] OR (“plantar fasci*”[tiab] OR “heel pain*” [tiab] OR “heel spur*” [tiab] OR “joggers heel*” [tiab] OR “policemans heel*” [tiab]) Concept 2 "Injections"[Mesh] OR (“injection*” [tiab] OR “infiltration*” [tiab] OR “insertion*” [tiab] OR “injectable*” [tiab])
Embase Concept 1 'plantar fasciitis'/exp OR 'plantar fasci*':ti,ab,kw OR 'heel pain*':ti,ab,kw OR 'heel spur*':ti,ab,kw OR 'joggers heel*':ti,ab,kw OR 'policemans heel*':ti,ab,kw Concept 2 'injection'/exp OR 'injection*':ti,ab,kw OR 'infiltration*':ti,ab,kw OR 'insertion*':ti,ab,kw OR 'injectable*':ti,ab,kw
Web of Science Concept 1 TS=(“plantar fasci*” OR “heel pain” OR “heel spur*” OR “joggers heel*” OR “policemans heel*”) Concept 2 TS=(“injection*” OR “infiltration*” OR “insertion” OR “injectable”)

Cochrane Library

Concept 1

[mh "fasciitis, plantar"] OR (plantar fasci* OR “heel pain” OR “heel spur*” OR “joggers heel*” OR “policemans heel*”):ti,ab,kw

Concept 2

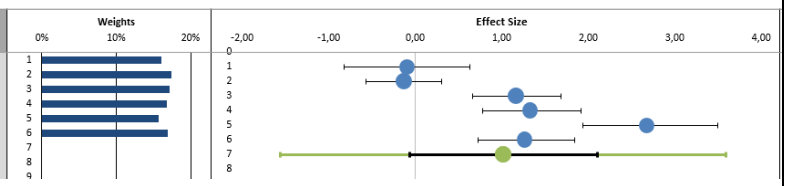
[mh "injections"] OR (injection* OR infiltration* OR insertion* OR “injectable*”):ti,ab,kw

Supplementary table II. *Detailed meta-analysis results*

VAS 3 months

Combined Effect Size	
Hedges' g	1,02
Standard error	0,42
CI Lower limit	-0,07
CI Upper limit	2,10
PI Lower limit	-1,56
PI Upper limit	3,59
Heterogeneity	
Q	55,53
p_Q	0,000
I^2	91,00%
T^2	0,82
T	0,91

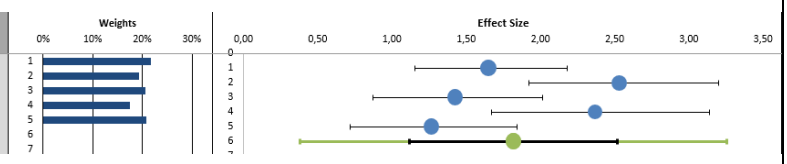
#	Study name	Hedges' g	CI Lower limit	CI Upper limit	Weight
1	Acosta-Olivo et	-0,10	-0,83	0,63	16,03%
2	Chakravarth H.Y.	-0,13	-0,57	0,31	17,45%
3	Sathyendra K.G.	1,16	0,67	1,69	17,12%
4	Sawan Z.H. et al	1,33	0,78	1,91	16,86%
5	Sharma G. et al.	2,67	1,94	3,49	15,66%
6	Tiwari M. et al.	1,26	0,72	1,84	16,88%
7					
8					
9					



VAS 6 months

Combined Effect Size	
Hedges' g	1,82
Standard error	0,25
CI Lower limit	1,12
CI Upper limit	2,52
PI Lower limit	0,38
PI Upper limit	3,26
Heterogeneity	
Q	13,32
p_Q	0,010
I^2	69,97%
T^2	0,21
T	0,45

#	Study name	Hedges' g	CI Lower limit	CI Upper limit	Weight
1	Chakravarth H.Y.	1,65	1,15	2,18	21,80%
2	Sathyendra K.G.	2,53	1,92	3,20	19,27%
3	Sawan Z.H. et al	1,42	0,87	2,01	20,60%
4	Sharma G. et al.	2,36	1,67	3,14	17,46%
5	Tiwari M. et al.	1,26	0,72	1,84	20,86%
6					
7					

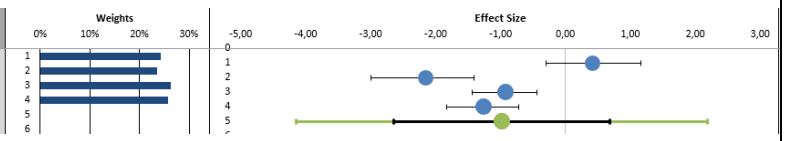


AOFAS 3 months

Combined Effect Size	
Hedges' g	-0,97
Standard error	0,52
CI Lower limit	-2,64
CI Upper limit	0,69
PI Lower limit	-4,14
PI Upper limit	2,19

Heterogeneity	
Q	25,15
p_Q	0,000
I^2	88,07%
T^2	0,72
T	0,85

#	Study name	Hedges' g	CI Lower limit	CI Upper limit	Weight
1	Acosta-Olivo et	0,42	-0,30	1,17	24,26%
2	Monto R.R. et al	-2,15	-2,99	-1,40	23,57%
3	Sathyendra K.G.	-0,93	-1,43	-0,44	26,36%
4	Sawan Z.H. et al	-1,26	-1,83	-0,72	25,82%
5					
6					

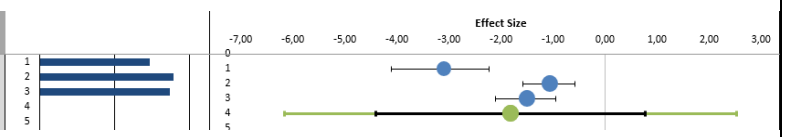


AOFAS 6 months

Combined Effect Size	
Hedges' g	-1,82
Standard error	0,60
CI Lower limit	-4,41
CI Upper limit	0,77
PI Lower limit	-6,17
PI Upper limit	2,53

Heterogeneity	
Q	14,85
p_Q	0,001
I^2	86,53%
T^2	0,66
T	0,81

#	Study name	Hedges' g	CI Lower limit	CI Upper limit	Weight
1	Monto R.R. et al	-3,10	-4,11	-2,22	29,50%
2	Sathyendra K.G.	-1,06	-1,58	-0,57	35,73%
3	Sawan Z.H. et al	-1,50	-2,10	-0,94	34,77%
4					
5					



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CONFLICT OF INTEREST

None.

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The Efficacy of Injections in Plantar Fasciitis: A Network Meta-Analysis

Dossiernr.:	MP033517
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Faculteit/opleiding:	Faculteit Geneeskunde - Master in de huisartsgeneeskunde
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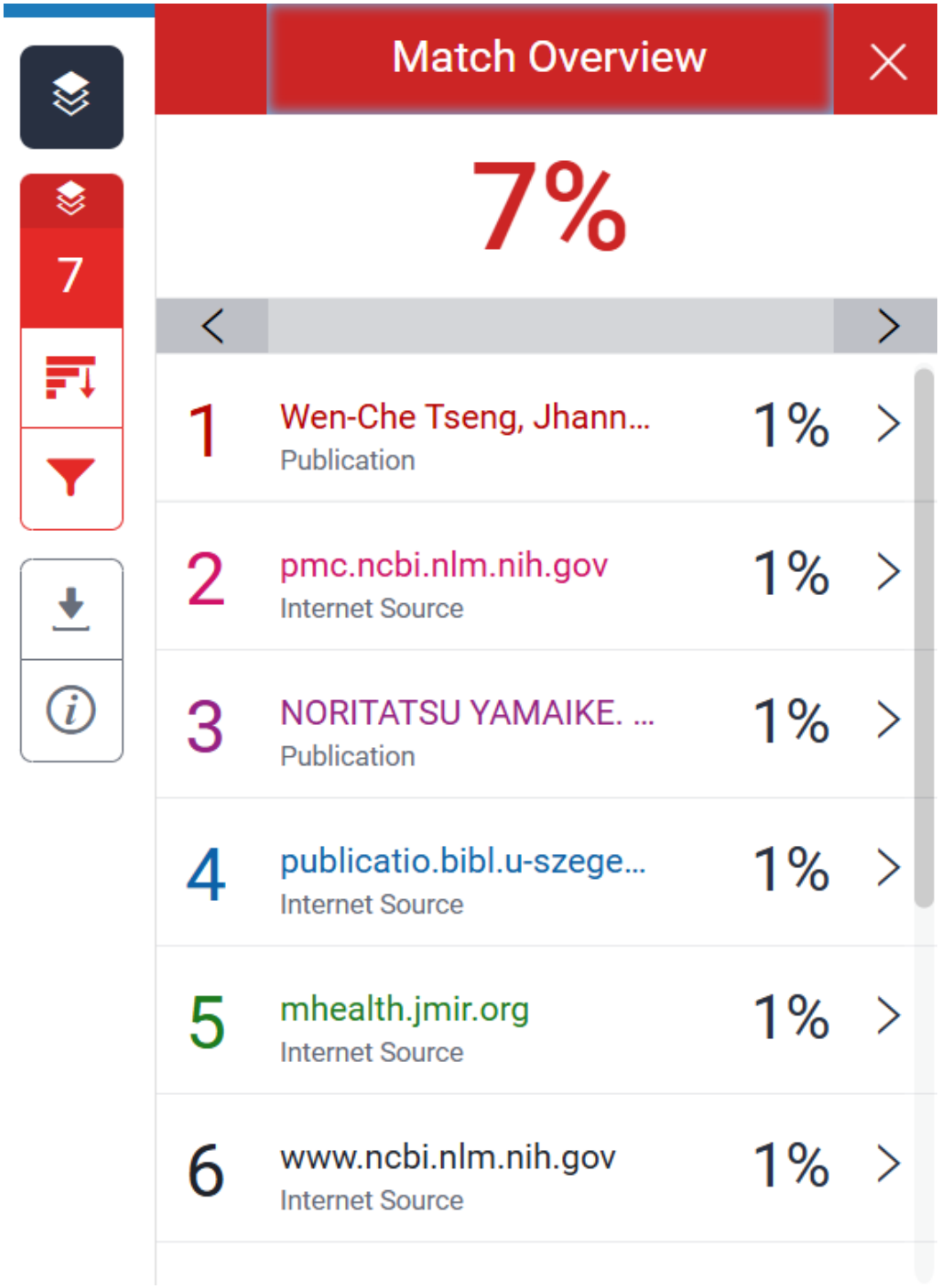
De verstrekte informatie toont aan dat het onderzoek in het kader van de masterproef een zuivere literatuurstudie betreft en dat er op geen enkele wijze gebruik wordt gemaakt van proefdieren, proefpersonen of menselijk lichaamsmateriaal.

Dit type onderzoek vereist geen goedkeuring van een gemachtigde commissie voor medische ethiek.

Onder voorbehoud van de volledigheid en correctheid van de door u verstrekte gegevens, krijgt u hierbij het akkoord om het onderzoek in het kader van de masterproef te starten. Deze mail dient als bewijs van goedkeuring mocht u uw onderzoek wensen te publiceren.

Wij willen u erop attent maken dat u zelf verantwoordelijk blijft voor uw onderzoek. Bovendien doet elke wijziging aan de door u verstrekte gegevens omtrent de onderzoeksopzet deze goedkeuring vervallen. U dient in dat geval een amendement te maken aan uw huidig dossier.

Turnitin: (08/04/2026)



Persoonlijke Reflectie - Jonathan Commeyne

Het schrijven van onze thesis rond het effect van verschillende infiltraties bij fasciitis plantaris, in de vorm van een systematic review en meta-analyse, vormde een intensief maar bijzonder leerrijk traject. Terugkijkend op het volledige proces kan ik stellen dat zowel het groepsverloop als mijn persoonlijke bijdrage zeer positief en verrijkend zijn geweest, en dat dit werk een duidelijke meerwaarde heeft voor mijn toekomstige functioneren als huisarts.

Wat het groepsproces betreft, heb ik de samenwerking als zeer vlot en aangenaam ervaren. Een belangrijke factor hierin was dat mijn collega en ik elkaar niet enkel professioneel kennen, maar ook op persoonlijk vlak goed op elkaar afgestemd zijn. Deze wederzijdse verstandhouding zorgde ervoor dat we open en eerlijk konden communiceren en dat we efficiënt tot beslissingen kwamen. Discussies verliepen steeds constructief en leidden tot inhoudelijke verdieping van ons werk, eerder dan tot vertraging.

In de beginfase van onze thesis hadden we het gevoel dat het proces eerder traag verliep. Dit was echter inherent aan de methodologische complexiteit van een systematic review en meta-analyse. Het opstellen van een correcte zoekstrategie in meerdere databanken (PubMed, Embase, Web of Science en Cochrane Library), het definiëren van strikte inclusie- en exclusiecriteria en het structureren van het volledige onderzoeksproces vroegen veel tijd en precisie . Hoewel dit initieel als traag werd ervaren, besef ik achteraf dat deze grondige voorbereiding essentieel was om de kwaliteit en betrouwbaarheid van onze resultaten te garanderen.

Een belangrijk onderdeel van onze samenwerking was het onafhankelijk screenen van alle artikels. Zoals beschreven in onze methodologie werden titels, abstracts en nadien volledige artikels door ons beiden afzonderlijk beoordeeld, waarna eventuele discrepanties via overleg werden opgelost . Dit proces was tijdsintensief, maar zorgde voor een verhoogde betrouwbaarheid van onze selectie en een gedeeld inzicht in de literatuur. Bovendien gaf dit ons beiden een volledig overzicht van de beschikbare evidentie, wat later in het schrijfproces zeer waardevol bleek.

Na de fase van full-text screening konden we het verdere werk meer verdelen, zoals data-extractie, kwaliteitsbeoordeling en het uitschrijven van verschillende onderdelen van de thesis. Deze taakverdeling verliep bijzonder vlot en evenwichtig. We hielden regelmatig overlegmomenten om de samenhang van het werk te bewaken en ervoor te zorgen dat onze schrijfstijl en inhoud consistent bleven.

Wat voor mij persoonlijk sterk heeft bijgedragen aan de efficiëntie van onze samenwerking, was het feit dat we vaak samen in dezelfde ruimte werkten. Dit maakte het mogelijk om snel te schakelen, vragen onmiddellijk te bespreken en discussiepunten

direct uit te klaren. Hierdoor konden we zeer efficiënt werken en tijdverlies vermijden. In de latere fase van het project merkten we dat we een duidelijke versnelling hoger schakelden en uiteindelijk ruimschoots op tijd klaar waren, wat getuigt van een goede planning en samenwerking.

Wat mijn persoonlijke aandeel betreft, ben ik tevreden over mijn inzet en betrokkenheid gedurende het volledige traject. Ik heb actief bijgedragen aan alle onderdelen van het onderzoek, waaronder de literatuursearch, screening, data-extractie en analyse. Daarnaast heb ik ook meegewerkt aan het kritisch evalueren van de geïncludeerde studies aan de hand van de Cochrane Risk of Bias tool, waarbij we vaststelden dat de meeste studies een lage tot matige kans op bias vertoonden . Dit proces heeft mijn kritisch denkvermogen verder

aangescherpt en mij geleerd om wetenschappelijke literatuur op een meer systematische en onderbouwde manier te beoordelen.

De inhoudelijke relevantie van het onderwerp was voor mij een belangrijke motivator gedurende het hele proces. Zowel mijn collega als ik hebben een sterke interesse in sportgeneeskunde, wat de keuze voor fasciitis plantaris en infiltratietherapieën zeer logisch maakte. Fasciitis plantaris is bovendien een veelvoorkomende aandoening in de huisartsenpraktijk, met een levenslange incidentie van ongeveer 10% . Dit maakte dat ons onderzoek niet enkel academisch relevant was, maar ook een directe link heeft met de klinische praktijk.

De resultaten van onze systematic review en meta-analyse hebben mijn kijk op de behandeling van fasciitis plantaris verder verfijnd. Zo bevestigt ons onderzoek duidelijk dat conservatieve therapie de hoeksteen blijft van de behandeling, met een succesratio tot ongeveer 90% . Dit benadrukt het belang van een stapsgewijze aanpak in de huisartsenpraktijk, waarbij niet-invasieve behandelingen steeds eerst optimaal moeten worden benut.

Daarnaast hebben we aangetoond dat verschillende infiltratietherapieën effectief kunnen zijn bij persisterende klachten. Onze analyse van 24 gerandomiseerde studies toonde aan dat zowel corticosteroïden als PRP leiden tot pijnreductie en functionele verbetering . Belangrijk hierbij is het onderscheid in tijdseffect: corticosteroïden zorgen voornamelijk voor snelle pijnverlichting op korte termijn, terwijl PRP eerder een langduriger effect lijkt te hebben, met significante pijnreductie na 6 maanden . Deze nuance is voor mij bijzonder waardevol in de klinische praktijk, aangezien dit toelaat om behandelingen beter af te stemmen op de verwachtingen en noden van de patiënt.

Verder viel het mij op dat er een toenemende interesse is in andere infiltratietechnieken, zoals botulinetoxine, hyaluronzuur en prolotherapie, hoewel de evidentie hiervoor momenteel nog beperkter en heterogeen is . Dit onderstreept het belang van verder onderzoek en maakt duidelijk dat dit een evoluerend domein is binnen de sportgeneeskunde en musculoskeletale zorg.

Tot slot heeft dit thesisproces mij niet enkel inhoudelijke kennis bijgebracht, maar ook belangrijke vaardigheden ontwikkeld. Het uitvoeren van een systematic review en meta-analyse heeft mij geleerd om gestructureerd en methodologisch correct te werken, kritisch om te gaan met literatuur en evidence-based beslissingen te onderbouwen. Deze vaardigheden zijn essentieel binnen de huisartsengeneeskunde, waar klinische beslissingen steeds meer gebaseerd zijn op wetenschappelijk bewijs.

Samenvattend kijk ik zeer positief terug op dit traject. De samenwerking verliep vlot en efficiënt, mijn persoonlijke bijdrage was betekenisvol, en de inzichten die we hebben verworven zijn direct toepasbaar in de klinische praktijk. Deze thesis vormt dan ook een waardevolle stap in mijn ontwikkeling als huisarts en heeft mijn interesse in evidence-based geneeskunde en sportgeneeskunde verder versterkt.

Persoonlijke reflectie – Renier Vandeberg

Het schrijven van deze masterproef rond de effectiviteit van injectietherapieën bij fasciitis plantaris was voor mij een intensief maar bijzonder leerrijk traject. Terugkijkend op het volledige proces ben ik vooral tevreden over het eindresultaat, maar minstens even waardevol zijn de inzichten die ik onderweg heb opgedaan, zowel op inhoudelijk als op persoonlijk vlak.

Een van de grootste sterktes van dit project was zonder twijfel de samenwerking. Deze verliep zeer vlot, wat grotendeels te danken is aan het feit dat we elkaar al lange tijd kennen. Hierdoor was er een groot wederzijds vertrouwen en een open communicatie. We waren allebei zeer laagdrempelig bereikbaar, waardoor we snel konden schakelen wanneer er beslissingen genomen moesten worden of wanneer er vragen opdoken. Taken werden spontaan verdeeld en er was een goede balans in inzet. Dit zorgde ervoor dat het groepswerk nooit als een last aanvoelde, maar eerder als een efficiënt en aangenaam proces. Ik heb hierdoor ook geleerd hoe belangrijk een goede teamdynamiek is voor het slagen van een langdurig project.

Daartegenover stond dat bepaalde onderdelen van het proces meer tijd in beslag namen dan initieel verwacht. Het schrijven van het protocol duurde in verhouding vrij lang. Dit was vooral te wijten aan onze beperkte ervaring met het opstellen van een systematische review en meta-analyse. In het begin hadden we moeite om een duidelijke structuur te vinden en om de juiste methodologische keuzes te maken. Begrippen zoals inclusiecriteria, zoekstrategieën en outcome measures moesten we diep voor in ons geheugen graven en vooral ons eigen maken, wat gepaard ging met veel opzoekwerk en herwerkingen. Achteraf gezien was dit echter een essentieel leerproces, omdat het protocol de basis vormt van de verdere studie. Het heeft me geleerd dat een grondige voorbereiding tijd vraagt, maar uiteindelijk veel problemen in latere fases kan voorkomen.

Een aspect dat ik sterk heb onderschat, was de beoordeling van bias met behulp van de RoB-2 tool. Bij de start leek dit een vrij rechtlijnige stap, maar in de praktijk bleek dit een zeer intensief en soms frustrerend proces. De tool is niet altijd even gebruiksvriendelijk en vereist een grondige interpretatie van de methodologie van elke studie. Vooral het beoordelen van domeinen zoals randomisatie en selectieve rapportering vroeg veel tijd en discussie. Dit werd ook weerspiegeld in onze resultaten, waarbij meerdere studies “some concerns” vertoonden door onduidelijke rapportering. Deze ervaring heeft me doen inzien hoe complex kwaliteitsbeoordeling kan zijn en hoe belangrijk transparantie in wetenschappelijk onderzoek is. In een toekomstig project zou ik hiervoor bij de start meer tijd inplannen.

Daarnaast wil ik benadrukken hoe waardevol de ondersteuning van de co-promotor was gedurende het hele traject. Zij stond steeds paraat om feedback te geven en om ons bij te sturen waar nodig. Dit gaf niet alleen richting aan het project, maar zorgde ook voor

een gevoel van zekerheid, zeker op momenten waarop we vastliepen. In het bijzonder herinner ik me de stress die ik ervaarde rond de statistische analyse en de software voor de meta-analyse. Dit was voor mij een volledig nieuw domein en ik had schrik dat dit een grote hindernis zou vormen. Dankzij de Excel-tool die door de promotor werd aangeboden, konden we deze stap echter veel vlotter doorlopen dan verwacht. Dit heeft me geleerd dat goede begeleiding en praktische tools een groot verschil kunnen maken in complexe onderzoeksprojecten.

Inhoudelijk heb ik veel bijgeleerd over het uitvoeren van een systematische review en meta-analyse. Het kritisch lezen van literatuur, het structureren van data en het interpreteren van statistische resultaten zijn vaardigheden die ik verder zal meenemen in mijn carrière. Ook het omgaan met heterogeniteit tussen studies en het kritisch reflecteren over de beperkingen van

onderzoek waren belangrijke leerpunten. Zo bleek uit onze analyse dat er een aanzienlijke heterogeniteit was tussen studies, wat het trekken van eenduidige conclusies moeilijker maakte. Dit heeft mijn inzicht in evidence-based medicine verder verdiept.

Tot slot ben ik zeer tevreden over het eindresultaat van onze thesis. Ondanks de uitdagingen en leermomenten zijn we er, vind ik, in geslaagd om een kwalitatief sterke systematische review en meta-analyse uit te voeren. We hebben een duidelijk antwoord kunnen formuleren op onze onderzoeksvraag en relevante klinische inzichten kunnen bieden. Het feit dat we zowel een uitgebreide narratieve synthese als een kwantitatieve analyse hebben uitgevoerd, beschouw ik als een grote meerwaarde.

Samenvattend kijk ik met een positief gevoel terug op afgelopen 2 jaar. Dit is vooral te danken aan de goede samenwerking, de ondersteuning van onze begeleiders en de kennis die ik heb opgedaan om altijd wetenschappelijke artikels kritisch te blijven bekijken. Tegelijkertijd ben ik mij ook bewust geworden van mijn werkpunten, zoals het beter inschatten van de tijdsinvestering (het maken van een tijdlijn en ons hier dan ook aan houden) voor complexe onderdelen zoals bias-analyse en methodologische uitwerking. Deze inzichten zullen mij zeker helpen in mijn verdere professionele carrière.