Table 1

Summary of unpooled data.

1a Summary of unpooled data for biophysical agents as an adjunct treatment – self-reported pain and function outcomes

Trial	Outcome	Intervention	Comparator	Short-term	Medium-term	Long-term
Qayyum et al.[1] 2022	Pain (VAS)	High power laser therapy + exercise	Exercise	End of treatment 4th week Favour high power laser therapy -0.91 [-1.41, -0.40]	–	–
	Pain (VAS)	High power laser therapy + exercise	Exercise	8th week follow-up Favour high power laser therapy -1.87 [-2.46, -1.29]	–	–
Rodrigues et al.[2] 2022	Pain (VAS)	Anodal transcranial direct current stimulation + exercise	Sham anodal transcranial direct current stimulation + exercise	At the end of the intervention No difference -0.03 [-0.77, 0.71]		
Celik et al.[3] 2020	Function (AKPS)	Neuromuscular electrical stimulation + exercise	Exercise	12th week follow-up No difference -0.19 [-0.95, 0.56]	–	–
Glaviano et al.[4] 2019	Pain (VAS) – current pain in the last week	Patterned electrical neuromuscular stimulation + exercise	Sham patterned electrical neuromuscular stimulation + exercise	End of treatment 4th week No difference -0.28 [-1.14, 0.58]	6-month follow-up No difference -0.60 [-1.48, 0.28]	12-month follow-up No difference -0.22 [-1.08, 0.64]
	Pain (VAS) – worst pain in the last week	Patterned electrical neuromuscular stimulation + exercise	Sham patterned electrical neuromuscular stimulation + exercise	End of treatment 4th week No difference -0.11 [-0.97, 0.75]	6-month follow-up No difference -0.71 [-1.60, 0.18]	12-month follow-up No difference -0.49 [-1.37, 0.38]
	Function (AKPS)	Patterned electrical neuromuscular stimulation + exercise	Sham patterned electrical neuromuscular stimulation + exercise	End of treatment 4th week No difference -0.02 [-0.88, 0.83]	6-month follow-up No difference 0.38 [-0.48, 1.25]	12-month follow-up No difference -0.17 [-1.03, 0.69]

Nouri et al.[5] 2019	Pain (VAS)	High-power laser + exercise	Sham laser + exercise	<u>End of treatment</u> <u>3rd month</u> No difference -0.29 [-0.91, 0.34]		
	Function (AKPS)	High-power laser + exercise	Sham laser + exercise	<u>End of treatment</u> <u>3rd month</u> Favours high-power laser 0.82 [0.17, 1.47]		
Bily et al.[6] 2008	Pain (VAS) – average knee pain during last week	Electric muscle stimulation + exercise	Exercise	3rd month No difference -0.29 [-0.95, 0.37]	–	<u>12th month</u> No difference -0.09 [-0.83, 0.64]
	Pain (VAS) – knee pain during activities of daily living	Electric muscle stimulation + exercise	Exercise	<u>3rd month</u> No difference -0.20 [-0.86, 0.45]	–	<u>12th month</u> No difference -0.19 [-0.93, 0.54]
	Pain (VAS) – knee pain during sports	Electric muscle stimulation + exercise	Exercise	<u>3rd month</u> Favours neuromuscular electrical stimulation -0.91 [-1.60, -0.22]	–	<u>12th month</u> No difference 0.14 [-0.59, 0.87]
	Function (AKPS)	Electric muscle stimulation + exercise	Exercise	–	–	<u>12th month</u> No difference -0.42 [-1.16, 0.32

Abbreviations: VAS, visual analogue scale; *AKPS,* anterior knee pain scale; *short-term* (<3 months); *medium-term* (3-12 months); *long-term* (>12 months).

1b. Summary of unpooled data for taping as an adjunct treatment – self-reported pain and function outcomes

Trial	Outcome	Intervention	Comparator	Short-term	Medium-term	Long term
Şahan et al.[7] 2023	Pain (VAS) – during activity	Taping + exercise	Exercise	End of treatment 6th week No difference -0.16 [-0.81, 0.50]	–	–
	Pain (VAS) – during buckling sensations	Taping + exercise	Exercise	End of treatment 6th week No difference 0.33 [-0.33, 0.99]	–	–
Songur et al.[8] 2023	Pain (VAS) – during activity	McConnell patellar taping + exercise	Exercise	End of treatment 6th week No difference 0.06 [-0.74, 0.86]	–	–
	Pain (VAS) – night time	McConnell patellar taping + exercise	Exercise	End of treatment 6th week No difference 0.07 [-0.73, 0.87]	–	–
	Pain (VAS) – at rest	Femoral rotation taping + exercise	Exercise	End of treatment 6th week No difference -0.11 [-0.91, 0.69]	–	–
	Pain (VAS) – during activity	Femoral rotation taping + exercise	Exercise	End of treatment 6th week No difference -0.56 [-1.38, 0.26]	–	–
	Pain (VAS) – night time	Femoral rotation taping + exercise	Exercise	End of treatment 6th week No difference -0.18 [-0.98, 0.63]	–	–
Basbug et al.[9] 2022	Pain (VAS) – stair descending	Taping + exercise	Exercise	End of adjunct treatment 6th week Favours taping -1.20 [-1.99, -0.41] End of treatment 12th week Favours taping -2.46 [-3.44, -1.48]	–	–
	Pain (VAS) – stair ascending	Taping + exercise	Exercise	End of adjunct treatment 6th week Favours taping	–	–

				-0.87 [-1.62, -0.11] <u>End of treatment 12th week</u> Favours taping -1.09 [-1.86, -0.31]		
Arrebola et al.[10] 2020	Pain (NPRS) – rest	Kinesio taping (patellar medialisation) + exercise	Exercise	<u>12th week follow-up</u> No difference -0.34 [-1.54, 0.86]	–	–
	Pain (NPRS) – effort	Kinesio taping (patellar medialisation) + exercise	Exercise	<u>End of treatment 12th week</u> No difference -0.35 [-1.09, 0.39] <u>12th week follow-up</u> Favours taping -0.96 [-2.24, -0.33]	–	–
	Pain (NPRS) – rest	Kinesio taping (lateral rotation of the femur and tibia) + exercise	Exercise	<u>End of treatment 12th week</u> No difference -0.13 [-0.85, 0.59] <u>12th week follow-up</u> Not estimable	–	–
	Pain (NPRS) – effort	Kinesio taping (lateral rotation of the femur and tibia) + exercise	Exercise	<u>End of treatment 12th week</u> No difference -0.54 [-1.27, 0.19] <u>12th week follow-up</u> Favours taping -0.96 [-2.24, -0.33]	–	–
	Function (AKPS)	Kinesio taping (patellar medialisation) + exercise	Exercise	<u>12th week follow-up</u> No difference -0.87 [-2.15, 0.40]	–	–
		Kinesio taping (lateral rotation of the femur and	Exercise	<u>End of treatment 12th week</u> No difference -0.01 [-0.73, 0.71]	–	–

		tibia) + exercise		12th week follow-up No difference -0.75 [-2.06; 0.56]		
Günay et al.[11] 2017	Pain (VAS)	Kinesiotaping + exercise	Exercise and Sham Kinesiotaping + exercise	12th week No difference 0.22 [-0.40, 0.84]	–	–
	Functional (AKPS)	Kinesiotaping + exercise	Exercise and Sham Kinesiotaping + exercise	12th week No differences 0.15 [-0.47, 0.77]	–	–
Akbaş et al.[12] 2011	Pain (VAS) – ascending stairs	Kinesiotaping + exercise	Exercise	End of treatment 6th week No difference 0.73 [-0.00, 1.46]	–	–
	Pain (VAS) – descending stairs	Kinesiotaping + exercise	Exercise	End of treatment 6th week No difference 0.69 [-0.04, 1.42]	–	–
	Pain (VAS) – Going down hill	Kinesiotaping + exercise	Exercise	End of treatment 6th week No difference 0.60 [-0.13, 1.32]	–	–
	Pain (VAS) – sitting	Kinesiotaping + exercise	Exercise	End of treatment 6th week Favours exercise 0.85 [0.11, 1.59]	–	–
	Pain (VAS) – squatting	Kinesiotaping + exercise	Exercise	End of treatment 6th week No difference 0.35 [-0.36, 1.06]	–	–
	Pain (VAS) – standing on knee	Kinesiotaping + exercise	Exercise	End of treatment 6th week No difference 0.13 [-0.58, 0.83]	–	–
	Pain (VAS) – going up hill	Kinesiotaping + exercise	Exercise	End of treatment 6th week No difference 0.25 [-0.45, 0.96]	–	–
	Pain (VAS) – walking	Kinesiotaping + exercise	Exercise	End of treatment 6th week No difference 0.50 [-0.22, 1.21]	–	–
Whittingham et al.[13] 2004	Pain (VAS) – previous 24 hours	Taping + exercise	Exercise	End of treatment 4th week Not estimable	–	–

	Pain (VAS) – step test without tape	Taping + exercise	Exercise	End of treatment 4th week Not estimable	–	–
	Pain (VAS) – step test with tape	Taping + exercise	Exercise	End of treatment 4th week Not estimable	–	–
	Function (FIQ)	Taping + exercise	Exercise	End of treatment 4th week Not estimable	–	–
Clark et al.[14] 2000	Pain (VAS) – difficulty in climbing stairs and walking on the flat	Taping + exercise	Exercise	–	–	12 months follow-up No difference -0.06 [-0.68, 0.56]
	Function (WOMAC)	Taping + exercise	Exercise	–	–	12 months follow-up No difference 0.05 [-0.57, 0.67]

Abbreviations: VAS, visual analogue scale, *NPRS,* numerical pain rating scale; *AKPS,* anterior knee pain scale; *WOMAC*, Western Ontario and McMaster Universities Osteoarthritis Index; *FIQ,* functional index questionnaire; *short-term* (<3 months); *medium-term* (3-12 months); *long-term* (>12 months)

1c. Summary of unpooled data for whole-body vibration as an adjunct treatment – self-reported pain and function outcomes

Trial	Outcome	Intervention	Comparator	Short-term	Medium-term	Long term
Corum et al.[15] 2018	Pain (VAS)	Whole body vibration + exercise	Exercise	6th month follow-up No difference -0.58 [-1.27, 0.11]	–	–
	Function (AKPS)	Whole body vibration + exercise	Exercise	6th month follow-up Favours whole body vibration -1.06 [-1.79, -0.34]	–	–

Abbreviations: VAS, visual analogue scale, *AKPS,* anterior knee pain scale; *short-term* (<3 months); *medium-term* (3-12 months); *long-term* (>12 months).

1d. Summary of unpooled data for dry needling as an adjunct treatment – self-reported pain and function outcomes

Trial	Outcome	Intervention	Comparator	Short-term	Medium-term	Long term
Ma et al.[16] 2020	Pain (VAS)	Dry needling + exercise	Sham needling + exercise	<u>End of treatment 6th week</u> Favours dry needling -1.67 [-2.33, -1.00]	–	–
				<u>3rd month follow-up</u> Favours dry needling -2.18 [-2.91, -1.45]		
	Function (AKPS)	Dry needling + exercise	Sham needling + exercise	<u>End of treatment 6th week</u> Favours dry needling -1.67 [-2.34, -1.01]	–	–
				<u>3rd month follow-up</u> Favours dry needling -2.20 [-2.93, -1.47]		
Zarei et al.[17] 2020	Pain (NPRS) – average knee pain intensity in the previous week	Dry needling + exercise	Exercise	<u>4th week (post-treatment)</u> Favours dry needling -1.93 [-2.69, -1.17]	–	–
				<u>6th week after the start of treatment (follow-up)</u> Favours dry needling -2.18 [-2.98, -1.39]		
	Function (AKPS)	Dry needling + exercise	Exercise	<u>End of treatment 4th week</u> Favours dry needling -1.36 [-2.05, -0.66]	–	–

				6th week after the start of treatment (follow-up) Favours dry needling -2.10 [-2.89, -1.31]		
Sutlive et al.[18] 2018	Pain (NPRS) – step up	Dry needling + exercise	Sham needling + exercise	72 hours No difference 0.00 [-0.51, 0.51]	–	–
	Pain (NPRS) – step down	Dry needling + exercise	Sham needling + exercise	72 hours No difference 0.31 [-0.20, 0.83]	–	–
	Pain (NPRS) – squat	Dry needling + exercise	Sham needling + exercise	72 hours No difference 0.30 [-0.21, 0.82]	–	–
	Function (AKPS)	Dry needling + exercise	Sham needling + exercise	72 hours No difference -0.52 [-1.04, 0.00]	–	–

Abbreviations: VAS, visual analogue scale, *NPRS,* numerical pain rating scale; *AKPS,* anterior knee pain scale; *short-term* (<3 months); *medium-term* (3-12 months); *long-term* (>12 months).

1e. Summary of unpooled data for knee brace as an adjunct treatment – self-reported pain and function outcomes

Trial	Outcome	Intervention	Comparator	Short-term	Medium-term	Long term
Lun et al.[19] 2005	Pain (VAS) – during sport activity	Patellar bracing + exercise	Exercise	12th week No difference -0.08 [-0.56, 0.41]	–	–
	Pain (VAS) – 1 hour after sport activity	Patellar bracing + exercise	Exercise	12th week No difference 0.47 [-0.02, 0.96]	–	–
	Pain (VAS) – following 30 minutes of sitting with knees flexed	Patellar bracing + exercise	Exercise	12th week No difference 0.08 [-0.41, 0.56]	–	–

Abbreviations: VAS, visual analogue scale, *KFS,* knee function scale; *short-term* (<3 months); *medium-term* (3-12 months); *long-term* (>12 months).

1f. Summary of unpooled data for manual therapy as an adjunct treatment – self-reported pain and function outcomes

Trial	Outcome	Intervention	Comparator	Short-term	Medium-term	Long term
Fatimah et[20] al. 2021	Pain (NPRS)	Tibiofemoral mobilisation + exercise	Exercise	End of treatment 4th week Favours tibiofemoral mobilisation -0.63 [-1.19, -0.07]	–	–
	Function (AKPS)	Tibiofemoral mobilisation + exercise	Exercise	End of treatment 4th week Favours tibiofemoral mobilisation -0.70 [-1.27, -0.14]	–	–
Telles et al.[21] 2016	Pain (NPRS)	Myofascial technique + exercise	Exercise	End of treatment 5th week No difference -0.66 [-1.61, 0.30]	–	–
	Function (LEFS)	Myofascial technique + exercise	Exercise	End of treatment 5th week No difference -0.48 [-1.42, 0.46]	–	–

Abbreviations: NPRS, numerical pain rating scale; *AKPS,* anterior knee pain scale; *LEFS,* Lower Extremity Functional Scale; *short-term* (<3 months); *medium-term* (3-12 months); *long-term* (>12 months).

1g. Summary of unpooled data for blood flow restriction as an adjunct treatment – self-reported pain and function outcomes

Trial	Outcome	Intervention	Comparator	Short-term	Medium-term	Long term
Giles et al.[22] 2017	Pain (VAS) – worst pain in the past week	Blood flow restriction + exercise	Sham blood flow restriction + exercise	End of treatment 8th week No difference -0.08 [-0.52, 0.36]	6 months follow-up No difference 0.09 [-0.35, 0.53]	-
	Pain (VAS) – with ADL (stair, squat or sitting)	Blood flow restriction + exercise	Sham blood flow restriction + exercise	End of treatment 8th week No difference -0.08 [-0.52, 0.36]	6 months follow-up No difference 0.30 [-0.15, 0.74]	-
	Function (AKPS)	Blood flow restriction + exercise	Sham blood flow restriction + exercise	End of treatment 8th week No difference -0.04 [-0.48, 0.40]	6 months follow-up No difference 0.12 [-0.32, 0.56]	-

Abbreviation: VAS, visual analogue scale; *ADL,* activity of daily living; *AKPS,* anterior knee pain scale; *short-term* (<3 months); *medium-term* (3-12 months); *long-term* (>12 months).

1h. Summary of unpooled data for EMG biofeedback as an adjunct treatment – self-reported pain and function outcomes

Trial	Outcome	Intervention	Comparator	Short-term	Medium-term	Long term
Dursun et al.[23] 2001	Pain (VAS) – greatest level of knee discomfort during the last week	EMG biofeedback + exercise	Exercise	2nd month No difference 0.13 [-0.38, 0.64] 3rd month Favours exercise 0.56 [0.04, 1.07]	-	-
	Function (FIQ)			1st month No difference -0.43 [-0.94, 0.09] 2nd month No difference -0.50 [-1.02, 0.01,] 3rd month No difference -0.08 [-0.58, 0.43]	-	-

Abbreviations: EMG, electromyographic, *VAS,* visual analogue scale, *FIQ,* functional index questionnaire; *short-term* (<3 months); *medium-term* (3-12 months); *long-term* (>12 months).

1i. Summary of unpooled data for internal and external attentional focus as an adjunct treatment – self-reported pain and function outcomes

Trial	Outcome	Intervention	Comparator	Short-term	Medium-term	Long term
Aghakeshizadeh et al.[24] 2021	Pain (VAS)	Internal focus + exercise	Exercise	End of treatment 6th week Favours internal focus -1.39 [-2.01, -0.77]	-	-
	Pain (VAS)	External focus + exercise	Exercise	End of treatment 6th week Favours to external focus -2.43 [-3.17, -1.68]	-	-
	Function (AKPS)	Internal focus + exercise	Exercise	End of treatment 6th week Favours internal focus -0.68 [-1.25, -0.11]	-	-
	Function (AKPS)	External focus + exercise	Exercise	End of treatment 6th week Favours to external focus -1.50 [-2.14, -0.87]	-	-

Abbreviations: VAS, visual analogue scale; *AKPS,* anterior knee pain scale; *short-term* (<3 months); *medium-term* (3-12 months); *long-term* (>12 months).

1j. Summary of unpooled data for mindfulness as an adjunct treatment – self-reported pain and function outcomes

Trial	Outcome	Intervention	Comparator	Short-term	Medium-term	Long term
Bagheri et al.[25] 2021	Pain (VAS) – usual pain	Mindfulness + exercise	Exercise	9th week No difference -0.17 [-0.90, 0.56] 18th week No difference -0.78 [-1.54, -0.02] 2nd month No difference -1.08 [-1.87, -0.29]	-	-
	Pain (VAS) – during running	Mindfulness + exercise	Exercise	9th week No difference -0.37 [-1.11, 0.37] 18th week No difference -0.63 [-1.38, 0.11] 2nd month No difference -0.65 [-1.40, 0.10]	-	-
	Pain (VAS) – during stepping	Mindfulness + exercise	Exercise	9th week No difference -0.57 [-1.31, 0.18] End of exercise program 18th week No difference -0.73 [-1.49, 0.03] 2-month follow-up No difference -0.75 [-1.51, 0.01]	-	-
	Function (KOS)	Mindfulness + exercise	Exercise	9th week No difference 0.57 [-0.18, 1.31] End of exercise program 18th week Favours control 0.73 [-0.03, 1.49] 2-month follow-up No difference	-	-

	0.75 [-0.02, 1.52]

Abbreviation: VAS, visual analogue scale; *KOS,* Knee outcome survey; *short-term* (<3 months); *medium-term* (3-12 months); *long-term* (>12 months).

Studies ineligible for pooling

Of the 20 trials ineligible to pool, various interventions were assessed, including taping,[9,13,26] dry needling,[16–18] blood flow restriction,[22,27] knee brace,[28] manual therapy,[20,21,29] internal and external attentional focus,[24] mindfulness,[25] foot orthoses,[30] and biophysical agents.[1,2,4,5,31] All trials examining taping, knee brace, internal and external attentional focus, mindfulness, and foot orthoses combined with exercise therapy showed symptom improvement in the short term when compared to exercise therapy alone. Conversely, results for dry needling, manual therapy, and blood flow restrictions are conflicting. Regarding biophysical agents, it was observed that higher power laser combined with exercise therapy and pulsed electromagnetic fields combined with exercise therapy led to pain reduction in the short-term when compared to exercise therapy alone.

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