

## Appendix 1: Search strategy and results

	Search terms	MEDLINE	EMBASE	CINAHL	SPORTDiscus	Web of Science	Scopus
1	Arthralgia	13099	46401	1310	64	4495	42568
2	Knee Joint OR Knee OR Patella	137304	181740	30204	39252	118874	180553
3	#1 AND #2	2020	4157	250	16	219	4496
4	anterior knee pain	3296	4931	392	666	3142	4570
5	femoropatell* OR femoro-patell* OR retropatell* OR "patellofemoral pain syndrome" OR "patellofemoral pain"	2043	1636	1145	1224	2185	2787
6	"lateral compression syndrome" OR "lateral facet syndrome" OR "lateral pressure syndrome" OR "facet syndrome"	138	239	25	21	118	237
7	chondromalac* or chondropath*	1252	230	141	411	1185	6225
8	#3 OR #4 OR #5 OR #6 OR #7	7675	10261	3230	2025	5963	16470
9	Success*	866281	327494	90406	76371	1123969	349693
10	Factor*	4528431	3032546	669098	106100	3446802	7141735
11	Predict*	1214973	421916	137305	43884	1894723	2982535
12	Charact*	2401783	169595	137915	55024	3992407	6553192
13	Prognos*	652826	54789	57054	4194	443798	827108
14	#9 OR #10 OR #11 OR #12 OR #13	7835734	3756532	888981	248457	9141006	16466975
15	#8 AND #14	2636	1665	600	491	1774	6013
16	Limit to human only studies	2196	1555	600	491	1774	5013

## Appendix 2: Details and patient characteristics evaluated in retrieved studies

Number	Patient Characteristic	Specified treatment studies (n)	Prognostic studies (n)	Successful outcome to a specified treatment	Poor outcome, regardless of treatment
1.	Age	7 [1-7]	7 [8-14]	>25 yrs to foot orthoses treatment [5]	Older [10]
2.	Sex	7 [1-7]	7 [8-10 12-15]		At 3 months: Female [9]
3.	Knee pain duration	6 [1 2 4-7]	7 [8-10 12-15]		At 6 weeks: Longer duration [12] At 3 months: >6 months, >4 months [9], At 12 months: Longer duration [12 15]
4.	Q- Angle	4 [2-4 7]	4 [9 10 16 17]	Larger Q angle to patella taping treatment [3]	
5.	Body mass index	5 [3 5-7 18]	3 [10 12-14]	Lower BMI to patella taping treatment[3]	
6.	Weight	5 [1 3 5 7 18]	3 [8 10 14]		
7.	Height	5 [1 3 5 7 18]	3 [8 10 14]		
8.	Sports participation	2 [1 6]	4 [8 10 13 15]		
9.	Navicular Drop	5 [1 2 4 7 19]		<3mm to foot orthoses treatment [4], >3mm to lumbopelvic manipulation [2]	
10.	Baseline worst pain score	2 [1 5]	3 [12 13 20]	<53.25mm (VAS) to foot orthoses treatment [5]	
11.	Hamstring muscle length	3 [2 4 7]	1 [15]		
12.	Anterior Knee Pain Scale (Kujala)	1 [5]	3 [12 20]		Low baseline score [12]
13.	Step-downs	1 [1]	3 [12 15 20]		
14.	Bilateral symptoms	2 [2 5]	2 [13 15]		Bilateral symptoms [13]
15.	Effusion	1 [2]	3 [9 13 17]		Self-reported swelling [13]
16.	Tibial torsion	3 [2 4 7]			
17.	Craig's test	3 [2 4 7]			
18.	Obers test	3 [2 4 7]			
19.	Thomas test	3 [2 4 7]			
20.	Ankle dorsiflexion (Bent knee)	3 [2 4 19]		<41.3deg to foot orthoses treatment [1], >16deg to lumbopelvic manipulation [2]	
21.	Arch height weight bearing	2 [5 18]	1 [12]		
22.	X-ray: Lateral Patellofemoral Angle	2 [3 7]	1 [10]	Smaller lateral patellofemoral angle to patella taping treatment[3]	
23.	X-ray: Sulcus angle	1 [7]	2 [10 17]		
24.	Functional index questionnaire	1 [5]	2 [12 15]		
25.	Pain when ascending stairs (VAS)		3 [15 20]		
26.	Pain when descending stairs (VAS)		3 [15 20]		
27.	Grating		3 [9 13 15]		
28.	Hypermobile		3 [9 10 17]		Hypermobile Patella

	patella				[9]
29.	Baseline usual pain score	2 [1 5]		<22/100mm usual pain to foot orthoses treatment [1]	
30.	Ankle dorsiflexion (Straight knee)	2 [4]			
31.	Rearfoot in subtalar neutral	2 [2 4]			
32.	Forefoot to rearfoot alignment	2 [2 4]		≥2deg valgus forefoot alignment to foot orthoses treatment [4]	
33.	Relaxed calcaneal stance	2 [2 4]			
34.	Tibial varus/valgus	2 [2 4]			
35.	Hip extension strength - Dynamometer	2 [7 19]			
36.	Hip abduction strength- Dynamometer	2 [7 19]			
37.	Knee extension strength- Dynamometer	2 [7 19]			
38.	Midfoot width weight bearing	2 [5 18]			
39.	Midfoot width non-weight bearing	2 [5 18]			
40.	Midfoot width difference	2 [5 18]		>10.96mm [5] and >11.25mm [18] to foot orthoses treatment	
41.	Arch height non-weight bearing	2 [5 18]			
42.	Arch height difference	2 [5 18]			
43.	Arch height ratio	2 [5 18]			
44.	Left knee pain	2 [2 7]			
45.	Right knee pain	2 [2 7]			
46.	First metatarsal phalangeal extension ROM	2 [2 4]		<78deg to foot orthoses treatment [4]	
47.	PFP affects ability to squat	2 [2 19]		Squatting reported as most painful activity to lumbopelvic manipulation [2]	
48.	Hip internal rotation ROM	2 [2 19]		>14deg side to side difference [2]	
49.	Stiff after prolonged sitting	2 [2 19]		No stiffness with sitting >20mins to lumbopelvic manipulation treatment [2]	
50.	Beighton Hypermobility Scale	1 [7]	1 [10]		
51.	X-ray Patella congruence angle	1 [7]	1 [17]		
52.	Leg Length discrepancy	1 [4]	1 [10]		
53.	X-ray: Lateral Patellofemoral Displacement	1 [3]	1 [10]		
54.	Clicking	1 [2]	1 [15]		
55.	Step-ups	1 [1]	1 [20]		
56.	Patella alta		2 [9 17]		
57.	Vastus Medialis		2 [9 17]		

	Atrophy				
58.	Peripatellar tenderness		2 [9 15]		
59.	Pain at rest		2 [15 20]		
60.	Triple hop (cm)		2 [15 20]		
61.	Pain when Squatting/ kneeling (VAS)		2 [15 20]		
62.	Pain during prolonged sitting (VAS)		2 [15 20]		
63.	Pain during daily activities (VAS)		2 [15 20]		
64.	Triple hop limb symmetry index		2 [15 20]		
65.	Single limb hop symmetry index		2 [15 20]		
66.	Pain at rest		2 [15 20]		
67.	Quadriceps muscle torque at 60deg/s (concentric)		2 [15 20]		
68.	Frequency of pain (how often)		2 [15 20]		Higher frequency [20]
69.	Patella grind test (Clarke sign)		2 [8 9]		
70.	Patellar glide	1 [2]	1 [15]		
71.	Patellar orientation	1 [4]			
72.	Pelvic obliquity	1[2]			
73.	McConnell test	1 [2]			
74.	Patellar tilt	1 [2]			
75.	Patella tilt angle difference	1[21]		Greater patella tilt angle difference [21]	
76.	Peak Medial-lateral foot loading during drop jump	1 [22]		Immediate decrease in medial - lateral peak foot force after fitting orthoses [22]	
77.	Peak Medial-lateral foot loading during drop jump	1 [22]			
78.	Peak Medial-lateral foot loading during drop jump	1 [22]			
79.	Peak Medial-lateral foot loading during drop jump	1 [22]			
80.	Ely Test	1 [7]			
81.	Femoral Slump test	1 [7]			
82.	History of low back pain	1 [7]			
83.	Leg Dominance	1 [7]			
84.	Bilateral difference in hip extension angle	1 [7]		After 6 sessions (2weeks): $\geq 3$ deg difference [7]	
85.	Significant immediate efficacy	1 [7]		After 6 sessions (2weeks): positive significant immediate response [7]	
86.	forefoot relative to rearfoot dorsiflexion	1 [23]			
87.	Forefoot relative to rearfoot Abduction	1 [23]			

88.	Rearfoot relative to laboratory floor eversion	1 [23]		Greater peak rearfoot eversion with foot orthoses treatment [23]	
89.	Rearfoot relative to tibia eversion	1 [23]			
90.	Previous knee pain history	1 [2]			
91.	Knee locking	1 [2]			
92.	Knee giving way	1 [2]			
93.	PFP affects ability to run	1 [2]			
94.	PFP affects ability to lift	1 [2]			
95.	PFP affects ability to go up stairs	1 [2]			
96.	PFP affects ability to go downstairs	1 [2]			
97.	Crepitus	1 [2]			
98.	Stiffness	1 [2]			
99.	Hip flexion strength - Manual muscle test	1 [2]			
100.	Hip extension strength- Manual muscle test	1 [2]			
101.	Hip abduction strength- Manual muscle test	1 [2]			
102.	Hamstrings strength- Manual muscle test	1 [2]			
103.	Quadriceps strength - Manual muscle test	1 [2]			
104.	Sitting flexion test	1 [2]			
105.	Stork test.	1 [2]			
106.	Hip external rotation strength- Dynamometer	1 [19]			
107.	Foot length	1 [18]			
108.	Single leg rises	1 [1]			
109.	Footwear motion control characteristics	1 [1]		>5.0 (weighted mean) to foot orthoses treatment [1]	
110.	Foot posture index	1 [1]			
111.	Change in functional performance	1 [1]		Reduced pain during single leg squat with foot orthoses in place [1]	
112.	change in footwear comfort	1 [1]			
113.	MRI tibial tubercle lateral deviation		1 [11]		
114.	MRI Patellar cartilage surface		1 [11]		
115.	MRI Trochlear cartilage surface		1 [11]		Evidence of chondromalacia patella [11]
116.	Patella Squinting		1 [10]		
117.	Rearfoot eversion -		1 [10]		

	Squatting test				
118.	Knee range of motion		1 [10]		
119.	Knee hyperextension		1 [10]		
120.	Insall-Salvati Index		1 [10]		
121.	Blackburne-Peel index		1 [10]		
122.	Patellofemoral Index		1 [10]		
123.	Knee angle (X-ray)		1 [10]		
124.	Tight lateral retinaculum		1 [9]		
125.	MRI Cross-sectional area VMO (patella)		1 [20]		
126.	MRI Cross-sectional area VL (patella)		1 [20]		
127.	MRI Cross-sectional area VM & VI (thigh)		1 [20]		
128.	MRI Cross-sectional area VL (thigh)		1 [20]		
129.	MRI Cross-sectional area Rectus femoris (thigh)		1 [20]		
130.	MRI Cross-sectional area total quadriceps (thigh)		1 [20]		Smaller quadriceps muscle size [20]
131.	Quadriceps muscle torque at 60deg/s (eccentric)		1 [20]		larger eccentric peak torque at 60deg/sec [20]
132.	Quadriceps muscle torque at 240deg/s (concentric)		1 [20]		
133.	Quadriceps muscle torque at 240deg/s (eccentric)		1 [20]		
134.	Retro-patellar cartilage damage		1 [16]		
135.	Age at symptom onset		1 [16]		
136.	Feeling of giving way		1 [15]		
137.	Length quadriceps		1 [15]		
138.	Length m. gastrocnemius		1 [15]		
139.	Step test ascending (Maximum height pain free)		1 [15]		
140.	Step test descending (Maximum height pain free)		1 [15]		
141.	Unilateral squat test (°pain free)		1 [15]		
142.	Pain during triple jump test		1 [15]		
143.	Reflex response time VMO		1 [15]		Slower reflex response time [15]
144.	Reflex response		1 [15]		

	time VL				
145.	Quadriceps muscle torque at 180deg/s,		1 [15]		
146.	Quadriceps muscle torque at 300deg/s		1 [15]		
147.	Hamstring muscle torque at 60deg/s		1 [15]		
148.	Hamstring muscle torque at 180deg/s		1 [15]		
149.	Hamstring muscle torque at 300deg/s		1 [15]		
150.	Pain during work		1 [15]		
151.	Pain during walking		1 [15]		
152.	Presence of crepitations		1 [15]		
153.	Pain during ascending stairs		1 [15]		
154.	Pain during descending stairs		1 [15]		
155.	Pain during running		1 [15]		
156.	Pain during jumping		1 [15]		
157.	Pain during sports activities		1 [15]		
158.	Nightly pain		1 [15]		
159.	Pain during squatting		1 [15]		
160.	Movie sign symptoms		1 [15]		
161.	Pain daily activity		1 [15]		
162.	Pain during isokinetic testing		1 [15]		
163.	Pain with patella apprehension test		1 [8]		
164.	Isometric quadriceps muscle strength side-to-side difference		1 [8]		Larger side to side isometric quadriceps muscle strength difference [8]
165.	X-ray malalignment		1 [8]		
166.	Pain score (VAS) during functional test		1 [7]		
167.	Pressure pain threshold localized		1 [24]		
168.	Pressure pain threshold distal		1 [24]		
169.	Education level		1[13]		Low/middle education level [13]
170.	Comorbidity skeletal system		1[13]		
171.	Non-skeletal comorbidity		1[13]		
172.	Poor health		1[13]		Poor health [13]
173.	History of knee symptoms		1[13]		
174.	Recurrence of symptoms		1[13]		
175.	Self-reported warm knee		1[13]		
176.	Locking of the		1[13]		

	knee (Lysholm)				
177.	Instability of the knee (Lysholm)		1[13]		
178.	WOMAC function		1[13]		
179.	WOMAC Pain		1[13]		
180.	WOMAC Stiffness		1[13]		

## References

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# Appendix

QUESTIONS	Barton 2011a	Barton 2011b	Blønd 1998	Collins 2010	Crowell 2012	Huang 2015	Averson 2008	Kannus 1994	Karlsson 1996	Kastelein 2015	Kettunen 2012	Lan 2010	Lankhorst 2015	Mills 2012	Natri 1998	Nimon 1998	Patlyn 2012	Peng 2015	Rathleff 2015a	Rathleff 2015b	Sutlive 2004	Vicenzino 2010	Witvrouw 2002	Wittstein 2009	Studies Scoring "Yes" (n(%))	
Q1. Reported study aim/																									2 (92%)	
Q2. Treatment clearly described																										4 (84%)
Q3. Main outcome measure described																										88%
Q4. Study Design described																										80%
Q5. Source of subject population clearly described																										16%
Q6. Eligibility criteria for subject selection clearly described																										88%
Q7. Participation rates reported																										32%
Q8. Participant characteristics described																										80%
Q9. Participants characteristics who are lost after entry or decline described																										72%
Q10. Important adverse effects reported																										4%
Q11. Intrinsic patient characteristics described																										52%
Q12. Extrinsic factors described																										20%
Q13. Statistical methods clearly described																										88%
Q14. Main findings of study clearly described																										100%
Q15. Reported variability in the data																										88%
Q16. Reported statistical parameters																										88%
Q17. Sample Size calculations																										28%
Q18. Comparability of case/control groups																										32%
Q19. Adequate participation rates																										32%
Q20. Study subjects from different groups recruited over the same time period																										8%
Q21. Subject losses taken into account																										76%
Q23. Randomisation of study subjects																										20%
Q24. Blinding of subjects and examiners to randomisation																										0%
Q29. Blinded observers																										36%
Q30. Subjects blinded																										8%
Q31. Main outcomes measures reliable																										16%
Q32. Main outcome measures valid																										24%
Q33. Assessment method of outcome variables standard across groups																										96%
Q34. Observations taken at same time point																										20%
Q35. Prior history collected and included in analysis																										48%
Q36. Adequate adjustment for covariates and confounders in terms of intrinsic variables in the analyses?																										36%
Q37. Adequate adjustment for covariates and confounders in terms of extrinsic variables in the analyses?																										8%
Q38. Sufficient follow-up time to detect a relationship between treatment and outcome?																										100%
Q39. Do the analyses adjust for different lengths of follow-up of subjects?																										84%
Q41. Reported data for subgroups of subjects																										80%
Q42. Generalizability of results to study populations																										60%
Q43. Generalizability of results to other populations																										60%
Average quality score (0-2)	1.18	1.00	1.13	1.36	0.95	1.31	1.20	1.11	0.68	1.35	1.35	1.11	1.32	1.32	1.11	0.43	1.06	1.49	1.73	1.54	1.26	1.17	1.11	1.03		

Black shading (2) = "Yes"; Grey shading (1) = "Partial"; White (0) = "No" or "Unable to determine"; 'shaded with a \*' = "Not applicable", items removed from scoring and not included in calculations.

Question 22, 25, 26, 27, 28 & 40 were removed as they are not applicable to intervention studies

Inter-rater agreement between the quality assessors was 87%