

Supplementary data

Table 1. Search strategy

Database	Search classes and limiters
PUBMED	"pelvic incidence" AND ("Hip"[Mesh] OR hip [tiab] OR cox* [tiab] OR femur* [tiab] OR femor* [tiab] OR *acetabul* [tiab]) AND has abstract [text]
CENTRAL	("pelvic incidence") and ([mh hip] or hip:ti or cox*:ti or femur*:ti or femor*:ti or acetabul*:ti)
SCOPUS	(ALL ("pelvic incidence")) AND (TITLE-ABS-KEY(hip OR cox* OR femur* OR femor* OR *acetabul*)) AND (LIMIT-TO(DOCTYPE,"ar"))
CINAHL	("pelvic incidence") AND ((MH Hip) OR (TI hip) OR (TI cox*) OR (TI femur*) OR (TI *femor*) OR (TI acetabul*))

Table 2. Demographic characteristics of the included studies

Study/Country	Design ^a	Reference if available	Radiographic methods	Inclusion/exclusion criteria
Hip osteoarthritis				
Bendaya et al. 2015 France/Canada	C-S	Healthy	Standing radiography EOS and 3D reconstruction	Including (osteoarthritis): isolated coxarthrosis. Excluding (osteoarthritis): arthroplasty in lower limb Excluding (healthy): coxarthrosis; previous arthroplasty; associated disorders in spine, knee, or ankle
Blondel et al. 2009 France	F-U	None	Standing radiography	Including: Primary unilateral coxarthrosis. Excluding: previous arthroplasty or spinal arthrosis
Bredow et al. 2015 Germany	F-U	None	Standing radiography EOS	Excluding: previous lumbar spine or hip surgery; coxarthrosis grade > 5; fracture; systemic or local infection; malignancy; chemotherapy; severe osteoporosis or spinal degeneration
Eyvazov et al. 2016 Turkey	F-U	None	Standing radiography	Including: coxarthrosis with significant low back pain. Excluding: spinal and/or lower extremity deformities; spinal surgery or fractures in lower limbs; radicular pain; spinal stenosis; and neurologic disorders affecting postural control
Ochi et al. 2016 Japan	C-S	None	Standing and sitting radiography	Excluding: hip surgery; spinal compression fracture; ankylosing spondylitis; major contralateral hip contracture; and neurologic or musculoskeletal disorder affecting pelvic alignment
Ochi et al. 2017 Japan	F-U	None	Standing radiography	Excluding: previous hip surgery; femoral head osteonecrosis; previous spine surgery; ankylosing spondylitis; rheumatoid arthritis; neurologic or musculoskeletal disorders affecting pelvic alignment; vertebral compression fracture; limitations of activities due to moderate or severe pain after surgery
Sariali et al. 2009 France	F-U	Healthy	Standing and sitting radiography	Excluding: spinal or lower extremity disorders
Weng et al. 2016 China	F-U	Healthy	Standing radiography	Excluding: other osteoarthritis or arthritis; dysplasia; surgery in spine, hip, or leg; neurologic deficit in leg; other diseases affecting sagittal alignment; index hip; severe osteophytes; vertebral compression; spondylolisthesis; and scoliosis. Healthy controls: 40–70 years of age; no spinal pathology or deformity; no hip, pelvic, or lower limb disorders; no pain in the low back or hip in previous 3 months
Weng et al. 2015 China	C-S	Healthy	Standing radiography	
Yoshimoto et al. 2005 Japan	C-S	Low back pain	Lateral radiography	Excluding: rheumatoid arthritis; aseptic necrosis of femoral head; hip fracture; femoral head deformity; infection; malignancy; severe hip subluxation and dislocation; and acetabular and/or femoral osteotomy
Ankylosing spondylitis				
Gao et al. 2015 China	F-U	None	Standing radiography	Excluding: previous spine or joint surgery; neoplasm; serious general disorders; pregnancy
Gu et al. 2015 China	F-U	None	Standing radiography	Not defined
Femoroacetabular impingement (FAI)				
Hellman et al. 2017 USA	C-S	Healthy ^b	Standing radiography and computed tomography	Excluding: coxarthrosis or childhood hip pathology
Weinberg et al. 2016 USA	C-S	Healthy	Computed tomography and magnetic resonance imaging	Including: history, physical exam, and imaging were consistent with hip impingement. Excluding: spine, hip, or femur trauma; hip or spine surgery; and spondylolisthesis
Subchondral insufficiency fracture (SIF)				
Jo et al. 2016 South Korea	C-S	Matched healthy	Lateral radiography and magnetic resonance imaging	Excluding: age < 50 years; osteonecrosis in any other joint; transplanted organs; alcohol abuse; and steroid use

^a C-S: Cross-sectional; F-U: Follow-up after hip replacement.

^b Extracted from the study by Viale et al. 2005.

Table 3. Main relevant results of the included studies

Study	Sample size	Gender (% women)	Age, mean (SD)	Mean pelvic incidence estimates (SD), °	Authors' comments and conclusions relevant to this review
Hip osteoarthritis					
Bendaya et al. 2015					
Coxarthrosis:	30	60	59.5 (15.6)	56.3 (11.5)	Pelvic incidence may have been underpowered. Contrary to the classical description, the difference in sacral slope relates more to a difference in the geometric parameter of pelvic incidence than to the functional parameter of pelvic tilt
Healthy:	30	47	46.0 (12.4)	52.1 (11.9)	
Blondel et al. 2009	50	48	64.0 (47–81)	56 (40–87)	None
Bredow et al. 2015	20	40	64.1 (14.4) ^a	53.9 (13.1)	The initial PI of a few patients was above average but the small sample size limited the results
Eyvazov et al. 2016	28	61	61.7 (6.4)	50 (35–60)	None
Ochi et al. 2016	74	81	65.5 (13.4) ^b	54.7 (13.6)	Nonsignificant results regarding the role of pelvic incidence
Ochi et al. 2017	92	84	67.5 (10.1)	51.2 (11.2)	Patients with larger pelvic incidence had poorer clinical outcomes
Sariali et al. 2009					None
Coxarthrosis	89	58	58.2 (2.0)	51.7 (5.0)	
Healthy	100	45	51.0 (10.0)	52.7 (9.0)	
Weng et al. 2016					None
Coxarthrosis	69	64	62.7 (9.9)	49.3 (11.1)	
Healthy	64	64	58.0 (10.6)	46.3 (9.3)	
Weng et al. 2015 ^f					Pelvic incidence might not be involved in coxarthrosis
Coxarthrosis	58	64	59.0 (11.9)	49.0 (10.8)	
Healthy	64	64	58.0 (10.6)	46.3 (9.3)	
Yoshimoto et al. 2005					Higher pelvic incidence in young age may contribute to the development of coxarthrosis
Coxarthrosis	150	80	61.1 (11.1)	58.5 (14.0) ^c	
Low back pain	150	80	58.9 (11.7)	51.9 (13.4) ^c	
Ankylosing spondylitis					
Gao et al. 2015	58	6	32.7 (3.1) ^d	50.0 (4.4)	Pelvic incident angle may correlate with life quality, body pain, vitality, and emotional role in patients with ankylosing spondylitis
Gu et al. 2015	29	0	37.7 (9.24)	(53.5–82.0)	None
Femoroacetabular impingement (FAI)					
Hellman et al. 2017					Lower pelvic incidence in patients with FAI than in general population
FAI	60	50	35.4 (12.0) ^e	49.3 (12.3)	
Healthy	300	37	32.6 (9.3) ^e	55.0 (10.6)	
			Historical controls		
Weinberg et al. 2016					Mixed-type FAI may develop as a response to decreased pelvic incidence. Pelvic incidence figures did not differ from the healthy group in Cam and retroverted types
Cam type	21			50.8 (4.6)	
Retroverted type	19			51.0 (4.6)	
Mixed type	25			46.7 (3.7)	
Healthy	27			56.1 (4.4)	
All together:		48	34.0 (3.0)		
Subchondral insufficiency fracture (SIF)					
Jo et al. 2016					None
SIF	37	89	70.5 (7.4)	54.3 (12.2)	
Healthy	37	89	70.7 (5.2)	55.4 (8.3)	

^a Exceptionally wide range 26 to 91 years;

^b Exceptionally wide range 27 to 86 years;

^c Exceptionally wide range 29 to 90 for coxarthrosis and 25 to 85 degrees for low back pain;

^d Figures are reported for the final sample size (n = 47) excluding one patient;

^e Exceptionally wide range 20 to 70 (FAI) and 18 to 53 (healthy) years;

^f Subgroup of the study by Weng et al. 2016.

Table 4. Pelvic incidence estimates reported by the included studies and their pooled figures along with those for an asymptomatic population

Study	n	% Women	Age	SD	Mean	SD	95% CI
Coxarthrosis							
Bendaya et al. 2015	30	60	59.5	15.6	56.3	11.5	52.2–60.4
Blondel et al. 2009	50	48	64.0	8.5 ^a	56.0	11.8 ^b	52.7–59.3
Bredow et al. 2015	20	40	64.1	14.4	53.9	13.1	48.2–59.6
Eyvazov et al. 2016	28	61	61.7	6.4	50.0	6.3 ^b	47.7–52.3
Ochi et al. 2016	74	81	65.5	13.4	54.7	13.6	51.6–57.8
Ochi et al. 2017	92	84	67.5	10.1	51.2	11.2	48.9–53.5
Sariali et al. 2009	89	58	58.2	2.0	51.7	5.0	50.7–52.7
Weng et al. 2016b	69	64	62.7	9.9	49.3	11.1	46.7–51.9
Yoshimoto et al. 2005	150	80	61.1	11.1	58.5	14.0	56.3–60.7
Pooled estimates	602	70	62.7	10.1	54.0	10.5	53.2–54.8
Ankylosing spondylitis^c							
Gao et al. 2015	58	6	32.7	3.1	50.0	4.4	48.9–51.1
Femoroacetabular impingement (FAI)							
Hellman et al. 2017	60	50	49.3	12.3	49.3	12.3	46.2–52.4
Weinberg et al. 2016							
Cam type	21	43	34.0	5.0	50.8	4.6	48.8–52.8
Retroverted type	19	53	36.0	7.0	51.0	4.6	48.9–53.1
Mixed type	25	48	34.0	3.0	46.7	3.7	45.2–48.2
Subchondral insufficiency fracture (SIF)							
Jo et al. 2016	37	89	70.5	7.4	54.3	12.2	50.4–58.2
Asymptomatic samples							
Jo et al. 2016	37	89	70.7	5.2	55.4	8.3	52.7–58.1
Legaye et al. 1998	49	43	24.0	5.8	53.2	10.3	50.3–56.1
Legaye et al. 2009	40	58	44.0	17.0	50.0	12.0	46.3–53.7
Roussouly et al. 2005	160	54	27.0	7.5 ^b	51.9	10.7	50.3–53.6
Sariali et al. 2009	100	45	51.0	10.0	52.7	9.0	50.9–54.5
Vialle et al. 2005	300	37	35.4	12.0	54.7	10.6	53.5–55.9
Weng et al. 015	64	64	58.0	10.6	46.3	9.3	44.0–48.6
Weinberg et al. 2016	27	48	33.0	5.0	56.1	4.4	54.4–57.8
Pooled estimates	777	46	38.9	10.4	52.9	10.1	52.2–53.6

^a Calculated from reported range as SD = (maximum – minimum)/4;

^b Study by Weng et al. 2015 removed as a subset of the study by Weng et al. 2016;

^c Study by Gu et al. 2015 was dropped out from the quantitative analysis—no mean pelvic incidence was reported.