

## **HIP ASSESSMENT IN PATIENT WITH PRIMARY AND SECONDARY HIP ARTHRITIS**

### **EVALUAREA FUNCȚIEI ȘOLDULUI LA PACIENTUL CU COXARTROZĂ PRIMARĂ ȘI SECUNDARĂ**

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#### **Abstract**

*Introduction.* Hip arthritis, also called coxo-femoral osteoarthritis or osteoarthritis of the hip, is a chronic condition characterized by the progressive destruction of articular cartilage at the coxo-femoral level.

*Aim.* This paper aims to perform a functional analysis of the hip joint in the context of primary and secondary hip osteoarthritis, as well as the impact of this condition on the quality of life of people diagnosed with this disease, translated by affecting patients' ability to perform daily activities, work and social.

*Material and method.* Thirteen patients diagnosed with hip osteoarthritis, aged between 45 and 80 years, with moderate or severe pain, restrictions in joint mobility, and difficulties in walking, stair climbing, or putting on shoes, volunteered to participate in this trial and gave their informed consent. Subjects were assessed for range of motion (ROM) using the goniometer, for muscle strength (manual muscle testing), hip function (WOMAC score).

*Results.* In ROM assessment we found limitations in all direction of hip movement. Also, a decreased muscle strength for all hip muscle, especially for hip abductors and adductors and also for hip internal and external rotators. In most patients with primary osteoarthritis, the pain is moderate, with moderate limitation of range of motion and moderate loss of function.

*Conclusion.* In patients with primary and secondary hip osteoarthritis, the muscular force of the abductors and adductor muscles, of the internal and external rotators and less of the flexors and extensors is reduced. The joint amplitude is reduced especially on flexion, abduction and adduction, internal and external rotation and almost not on extension. The functional deficit is average in terms of joint amplitude, limited mobility, the pain is of medium intensity.

**Key words:** *hip osteoarthritis, range of motion, muscle strength, hip function, WOMAC score*

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## **Rezumat**

*Introducere.* Coxartroza, numită și osteoartrita coxo-femurală sau osteoartrita de șold, este o afecțiune cronică caracterizată prin distrugerea progresivă a cartilajului articular la nivel coxo-femural.

*Scop.* Lucrarea de față își propune să realizeze o analiză funcțională a articulației șoldului în contextul osteoartritei primare și secundare de șold, precum și impactul acestei afecțiuni asupra calității vieții persoanelor diagnosticate cu această boală, tradusă prin afectarea capacității de performanță a pacienților. activități zilnice, de muncă și sociale.

*Material și metodă.* Treisprezece pacienți diagnosticați cu osteoartrită de șold, cu vârste cuprinse între 45 și 80 de ani, cu durere moderată sau severă, restricții ale mobilității articulare și dificultăți la mers, urcat scările sau încălțare, s-au oferit voluntar să participe la acest studiu și și-au dat consimțământul informat. Subiecții au fost evaluați pentru amplitudinea de mișcare (ROM) folosind goniometrul, pentru forța musculară (testarea musculară manuală), funcția șoldului (scorul WOMAC).

*Rezultate.* În evaluarea ROM s-auevidențiat limitări în toate direcțiile de mișcare a șoldului. De asemenea, s-a observat o scădere a forței musculare pentru toți mușchii șoldului, în special pentru abductorii și adductorii șoldului și, de asemenea, pentru rotatorii interni și externi. La majoritatea pacienților cu osteoartrita primară, durerea este moderată, cu limitare moderată a amplitudinii de mișcare și pierdere moderată a funcției.

*Concluzie.* La pacienții cu coxartroză primară și secundară de șold, este redusă forța musculară abductorilor și adductorilor, a rotatorilor interni și externi și mai puțin a flexorilor și extensorilor. Amplitudinea articulară este redusă mai ales la flexie, abducție și adducție, rotație internă și externă aproape deloc la extensie. Deficitul funcțional este mediu în ceea ce privește amplitudinea articulară și limitarea mobilității, durerea fiind de intensitate medie.

**Cuvinte cheie:** *coxartroză, amplitudine articulară, forță musculară, funcția șoldului, scorul WOMAC*

## **Introduction**

Hip arthritis, also called coxo-femoral osteoarthritis or osteoarthritis of the hip, is a chronic condition characterized by the progressive destruction of articular cartilage at the coxo-femoral level.

Osteoarthritis (OA) is a disease with a slow onset, on average after the age of 50, presenting with joint pain and stiffness, swelling, and instability resulting in functional impairment in daily activities [1]. It has a progressive, continuous evolution that eventually leads to ankylosis (blockage) of the hip joint, accompanied by very severe pain. Consequently, symptomatic hip OA often leads to hip replacement surgery. [2, 3]

It is often a disease present in the elderly and the elderly [4]. It can also occur in young people, following a very strong trauma to the hip: hip dislocation, femoral head fracture, or it can occur secondarily in the context of other diseases treated incorrectly or neglected: congenital hip dislocation, epiphysiolysis, Rheumatoid arthritis, Calvé-Legg-Perthes disease, congenital dysplasia of the hip [5].

Because there is no known cure for OA, clinical management of hip OA is mainly targeting pain reduction, increasing hip function and therefore the quality of life. [6]

In patients with hip osteoarthritis, a lack of strength lower extremity muscle was found, but there is less literature and lack of supporting evidence on muscle strength in hip OA or on which muscles are most affected [7, 8]. This generalized muscle weakness may be due to muscle atrophy, reduced muscle density [9], and muscle inhibition [10]. Because of lower limb muscle weakness, it is very important to determine the mechanisms underlying this condition, in order to develop efficient rehabilitation programs for hip osteoarthritis in order to prevent the development of strength asymmetries characteristic of advanced hiposteoarthritis. [11]

In osteoarthritis condition, there is a failure in the dynamic equilibrium between the breakdown and repair of joint tissues. Structural destruction of the articular cartilage can be due to the abnormal mechanical strains of the cartilage and also due to influence of physiological mechanical strains. [12]

Pain can be very debilitating and therefore can have a significant impact on the physical function and quality of life of patients with hip osteoarthritis. [13]

## **Aim**

This paper aims to perform a functional analysis of the hip joint in the context of primary and secondary hip osteoarthritis, as well as the impact of this condition on the quality of life of people diagnosed with this disease, translated by affecting patients' ability to perform daily activities, work and social.

## **Study design**

### ***Participants***

Participants were recruited from the Felix Spa Clinical Hospital of Medical Rehabilitation and OsteoKinetoMedica private practice clinic. Thirteen patients diagnosed with hip osteoarthritis, aged between 45 and 80 years, with moderate or severe pain, restrictions in joint mobility, and difficulties in walking, stair climbing, or putting on shoes, volunteered to participate in this trial and gave their informed consent. They responded to a self-reported questionnaire regarding health, comorbidities, medication, and workplace. Participants were undergo to an examination, which included measurements of physical functioning (strength, mobility, pain intensity and activities of daily living). Inclusion criteria were age  $\geq 45$  years, primary and secondary hip OA with pain in the hip region (groin and lateral hip) during the last month. Exclusion criteria were bilateral total hip replacement, chronic conditions such as rheumatoid arthritis or major surgical procedures in the last 6 months (lower limb or lower back). Medication used was not an inclusion or exclusion criterion.

### ***Assessment tools***

Physical functioning (strength and hip joint mobility) was measured objectively.

*Hip range of motion assessment.* To assess joint mobility we used the goniometer method to determine the degrees of flexion, extension, abduction, adduction, internal rotation and external rotation of the hip. [14]

*Hip muscle strength assessment.* In order to assess muscle strength manual muscle testing was used. Katharine M. and colab. (2011) showed that manual muscle testing (MMT) is used as a break testing. The subject is asked to hold the body segment in place, against the tester's gradually increasing pressure. Break testing is described in Kendall and Kendall *Muscles Testing and Function* [15] and is graded on a 0 to 5 scale (Table 1). This resistance corresponds to the strength that the individual should possess according to sex, age, profession (the testator appreciating this level of resistance and according to his experience). If the muscle on the contralateral side can give valid information (it is normal), it will be used as a reference (control) to stabilize the resistance that should be defeated [16, 17]. In this study were assessed the following muscle groups: iliopsoas, sartorius, tensor fascia latae, gluteus maximus, gluteus medius, gluteus minimus, adductors group, pectineus, pelvirochanteric muscles.

**Table no. 1 Manual muscle testing**

Grade	
F0 (absent)	No elicited contraction
F1 (mild)	Flicker of movement
F2 (fair)	Through full range actively with gravity counterbalanced
F3 (good)	Through full range actively against gravity
F4 (very good)	Through full range actively against some resistance
F5 (normal)	Through full range actively against strong resistance

#### *Pain and Self-Reported Physical Function*

One of the aims of the study was hip joint pain assessed by the Western Ontario and McMaster University Osteoarthritis Index. WOMAC consist of three subscales (pain, stiffness, and physical function) and a total score (WOMAC Index) that reflects overall disability.

The test questions are scored on a scale from 0 to 4, which correspond as follows: none / none (0) // mild (1) // moderate (2) // severe (3) // extreme (4). This score includes 24 items, the minimum score is 0, and the maximum score is 96. The scores for each subscale are summed, with a possible score between: 0 and 20 for pain, 0-8 for mobility limitation, 0-68 for physical function. A high Womac score indicates extreme pain, severe limited mobility and major limitation of physical function. [18]

#### **Statistical Analysis**

For statistical analysis SPSS 15.0 was used. Values are presented as means and standard deviations (SD).

#### **Results**

All participants, 40% men, 60% women, were nonsmoking patients with mean age (SD) of 62.50 (6.0) years. Mean height was 164 (7.0) cm, weight was 78.40 (12.3) kg, and body mass index (BMI) was 29.07 (3.3) kg/m<sup>2</sup>. The duration of illness was 11.25 (2.4). From all subjects (30), 90% had primary hip arthrosis and 10% had secondary hip arthrosis. Three women had no diagnosed illness other than hip OA, and the most common medication was for high blood pressure. No changes were

made in OA medication during the intervention. The most often used medication was the NSAIDs (nonsteroid anti-inflammatory drugs).

*Table no.2 Subjects characteristics*

Nr. crt.	Subject characteristics	Mean ±Std.dev	Min.	Max.
1	Age	65.20± 6.0	45	80
2	Duration	11.25± 2.4	3	17
3	Heigh	1.64± 7.0	1.50	1.80
4	Weight	78.40± 12.3	65	95
5	BMI	29.07± 3.3	28.33	30.11
Nr. crt.	Subject characteristics	Frecv. %	Frecv. %	
6.	Gender	Men 40 %	Women 60 %	
7.	Diagnostic/ stage	Primare 90%	Secondary 10%	
8.	Lifestyle	Sedentary life 90%	Active life 10%	
9.	Medication	Ketoprofen, Diclofenac, Hidrocortizon, Metilprednisolon, Hialuronic acid		

*Table no. 3 Hip range of motion*

Hip ROM	Mean±Std. Dev.	Min.	Max.	Normal value
Flexion with knee flexed	75.73±25.193	25	100	125
Flexion with knee extended	63.13±27.369	10	88	90
Extension	10.00±1.438	8	12	15
Abduction	29.20±12.430	14	45	60
Adduction	17.20±5.397	11	24	30
Internal rotation	8.03±2.092	5	10	15
Internal rotation	16.00±4.410	10	21	35

Comparing the results with normal hip flexion values with the knee flexed (125°) and the knee extended (90°), it can be seen that on average, the patients included in the study have an active flexion deficit of 46° with the knee flexed and 27° with the knee extended.

The largest difference in joint amplitude is 95° with the knee bent and 80° with the extended knee present in the patient diagnosed with secondary hip osteoarthritis and in the patient diagnosed with primary hip osteoarthritis the difference is 47° with the knee flexed and 27° with the knee extended. There is also a significant difference of 48° with the knee bent and 53° with the knee extended, regarding the joint aptitude of people with secondary and primary hip osteoarthritis, the latter having a higher mobility.

Comparing the results with the normal values of hip extension (15°), it can be seen that on average, the patients included in the study have an active extension deficit of 5°. The largest difference in joint amplitude is 7° present in the patient diagnosed with secondary hip osteoarthritis and in the patient diagnosed with primary hip osteoarthritis the difference is 6°. There is also a small difference of 1° regarding the joint aptitude of people with secondary and primary hip osteoarthritis, the latter having a slightly higher mobility. Comparing the results with the normal values of hip abduction (60°), it can be seen that on average, the patients included in the study have an active abduction deficit of 31°. The largest difference in joint amplitude is 46° present in the patient diagnosed with secondary hip

osteoarthritis and in the patient diagnosed with primary hip osteoarthritis the difference is 43°. A small difference of 3° can also be seen in the joint aptitude of people with secondary and primary hip osteoarthritis, the latter having a slightly higher mobility. Comparing the results with the normal values of hip adduction (30°), it can be seen that on average, the patients included in the study have an active adduction deficit of 13°. The largest difference in joint amplitude is 19° present in the patient diagnosed with secondary hip osteoarthritis and in the patient diagnosed with primary hip osteoarthritis the difference is 17°. There is also a small difference of 2° regarding the joint aptitude of people with secondary and primary hip osteoarthritis, the latter having a slightly higher mobility.

Comparing the results with the normal values of the internal rotation of the hip (15°), it can be seen that on average, the patients included in the study have an active internal rotation deficit of 7°. The largest difference in joint amplitude is 9° present in the patient diagnosed with secondary hip osteoarthritis and in the patient diagnosed with primary hip osteoarthritis the difference is 10°. There is also a small difference of 1° regarding the joint aptitude of people with secondary and primary hip osteoarthritis, the latter having a slightly lower mobility this difference can be explained due to aging and the onset of the pathology (17 years).

Comparing the results with the normal values of the external rotation of the hip (35°), it can be seen that on average, the patients included in the study have an active external rotation deficit of 19°. The largest difference in joint amplitude is 25° present in the patient diagnosed with secondary hip osteoarthritis and in the patient diagnosed with primary hip osteoarthritis the difference is 23°. There is also a small difference of 2° regarding the joint aptitude of people with secondary and primary hip osteoarthritis, the latter having a slightly higher mobility.

**Table no. 4 Muscle test results for hip strength**

Flexion	Extensie	Abduction	Adduction	Internal rotation	Internal rotation	Min.	Max.
60% F3+	20% F3+	100% F3+	100% F3+	100% F3+	100% F3+	F0	F5
40% F4-	80% F4-	-	-	-	-		

From the data presented in the tables above it is observed that all patients have a muscle strength between F3 and F4. Force 3 means the force of a muscle to mobilize the tested lower limb against gravity. A higher force F4- and F4 is observed in flexion and extension movements, this "increased" force can be explained by the fact that these movements are performed by larger and more developed muscle groups, but also by the fact that these movements are used, especially in everyday life, in almost any circumstance: walking, getting out of bed, sitting on a chair, and in this way their hypotonia is slowed down.

**Table no. 5 WOMAC score**

	Mean±Std. Deviation	Minimum	Maximum	Normal values Min./Max.
WOMAC pain score	9.80±5.041	3	17	0/20
WOMAC mobility score	5.20±1.349	3	7	0/8
WOMAC joint function score	41.80±11.657	21	56	0/64
Total WOMAC score	57.00 ± 14.02	3	17	0/92

Comparing the results with the minimum (0) and maximum (20) values of the subscale, it can be seen that the average patient included in the study is 10. The maximum subscriber that can be obtained is 20. A large Womac subscale indicates extreme pain. The score of 10 out of 20 allows us to say that in most patients with primary hip osteoarthritis, the pain is moderate. The closest value (3) to the minimum value of the subscale (0) is present in the patient diagnosed with primary hip osteoarthritis, in which the pathology started 3 years ago. This subscript indicates that this patient has mild pain. The closest value (17) to the maximum value of the subscale (20) is present in the patient diagnosed with primary hip osteoarthritis, in whom the pathology began 17 years ago, which means that this patient has extreme pain.

Comparing the results with the minimum (0) and maximum (8) values of the subscale, it can be seen that the average patient included in the study is 5. The maximum subscriber that can be obtained is 8. A large WOMAC subscale indicates an excessive decrease in mobility. hip after the first half of walking and later in the day. The 5 out of 8 survey allows us to say that in most patients with primary hip osteoarthritis, mobility is quite low. The closest value (3) to the minimum value of the subscale (0) is present in the patient diagnosed with primary hip osteoarthritis, in which the pathology started 3 years ago. This subscript indicates that this patient has good joint mobility. The closest value (7) to the maximum value of the subscale (8) is present in the patient diagnosed with primary hip osteoarthritis, in whom the pathology began 17 years ago, which means that this patient has severe mobility limitations, especially morning.

Comparing the results with the minimum (0) and maximum (64) values of the subscale, it can be seen that the average patient included in the study is 42. The maximum subscriber that can be obtained is 64. A large Womac subscale indicates a deficit in joint function. of the hip in carrying out daily activities. The 42 out of 68 survey allows us to say that in most patients with primary hip osteoarthritis, they have a high deficit of hip joint function. The closest value (21) to the minimum value of the score (0) is present in the patient diagnosed with primary hip osteoarthritis, in which the pathology started 3 years ago. This score indicates that this patient does not encounter major difficulties during daily activities. The closest value (56) to the maximum value of the subscale (64) is present in the patient diagnosed with primary hip osteoarthritis, in whom the pathology began 17 years ago, which means that this patient encounters great difficulties during daily activities. and it also follows that he would need help to carry out some activities of daily living.

Comparing the results with the minimum (0) and maximum (92) score values, it can be seen that the average score is 57. The maximum score that can be obtained is 92. A high WOMAC score indicates extreme pain, severe limitation mobility and major limitation of physical function.

The score of 57 out of 92 allows us to say that in most patients with primary osteoarthritis, the pain is moderate, with moderate limitation of range of motion and moderate loss of function. The closest value (27) to the minimum value of the score (0) is present in the patient diagnosed with primary hip osteoarthritis, in which the pathology started 3 years ago. This score indicates that this patient has mild pain, with slight limitation of mobility and a reduced loss of hip function. The closest value (80) to the maximum value of the score (92) is present in the patient diagnosed with primary hip

osteoarthritis, in which the pathology began 17 years ago, which means that this patient has extreme pain, severe limitation of mobility and major limitation of physical function.

### **Discussions**

The aim of the present study was to perform an assessment of mobility, strength and hip function in patients with primary and secondary hip osteoarthritis. Regarding the hip range of motion, we can say that on average, there is an active flexion deficit of 46° with the knee flexed and 27° with the knee extended. There is also a significant difference of 48° flexion with the knee flexed and 53° with the knee extended, between people with secondary and primary hip osteoarthritis, the latter having greater mobility.

On average, hip extension (15° normal) in patients with primary and secondary hip osteoarthritis is not affected, with only a slight deficit of active extension of 5°. Regarding the extension deficit, there is no significant difference between patients with primary hip osteoarthritis and those with secondary hip osteoarthritis. Hip arthritis affects active abduction of the hip, which has an average deficit of 31° to normal (60°). There are no significant differences in the extent of abduction in patients with primary and secondary hip osteoarthritis, the deficit being only 3°. Hip arthritis also affects the adduction of the hip, on average the deficit being 13° compared to the normal active adduction (30°). There are no significant differences in the amplitude of adduction in patients with primary and secondary hip osteoarthritis, the deficit being only 3°. Internal and external rotation are affected approximately to the same extent, on average, patients with a deficit of external hip rotation of 7° to normal (15°), and a deficit of 19° of internal rotation to normal (35°). There are no significant differences in the amplitude of internal and external rotation in patients with primary and secondary hip osteoarthritis, the deficit being 2° and 1°, respectively.

Regarding the muscular strength at the level of the hip, in all patients the main muscle groups of the hip have forces between F3 and F4, which means that in hip osteoarthritis is also affected the muscular force, which decreases from a maximum of 5 to values of 3 and 4.

Regarding the assessment of pain, limited mobility and joint function, performed using the Womac Test, it is observed that on average, the patients included in the study have an average WOMAC score of 57 out of a maximum of 92, which means that in most patients with primary osteoarthritis and secondary, the pain is moderate, with moderate limitation of range of motion and moderate loss of function.

### **Conclusions**

In conclusion, in patients with primary and secondary hip osteoarthritis, the muscular force of the abductors and adductor muscles, of the internal and external rotators and less of the flexors and extensors is reduced. The joint amplitude is reduced especially on flexion, abduction and adduction, internal and external rotation and almost not on extension, the functional deficit being average in terms of joint amplitude, limited mobility, the pain being of medium intensity.



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