

RESEARCH ARTICLE

Is quality of life related to risk of falling, fear of falling, and functional status in patients with hip arthroplasty?

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Abstract

Objective: The aim of the study was to investigate the relation between health-related quality of life and risk of falling, fear of falling, and functional status in patients with hip arthroplasty.

Methods: In this cross-sectional study, 48 hips of 45 patients who aged between 33 and 79 (53.56 ± 12.50) years and had cementless total hip arthroplasty between 2010 and 2014 were evaluated. Twenty-seven of the patients participated in the study were female (60.0%) and 18 were male (40.0%). Health-related quality of life with Nottingham Health Profile, function of the hip joint with Harris Hip Score, risk of falling with Performance-Oriented Motion Assessment I, and fear of falling with Falls Efficacy Scale were assessed. In addition, chair stand test, 40-m walk test, stair-climb test, and single leg stance test were carried out. In analysing the relationships between these parameters, Pearson correlation analysis was employed. The level of significance was considered as $p < 0.05$.

Results: Among the cases, who were evaluated 87.10 ± 45.22 (22.43–214.71) weeks after the operation, a significant correlation was found between health-related quality of life and risk of falling, function of hip joint, and functional tests ($p < 0.05$).

Conclusion: The evaluation of the factors related to health-related quality of life in hip arthroplasty patients may help identify patient needs and guide the rehabilitation process.

KEYWORDS

falls, hip replacement arthroplasty, quality of life, recovery of function

1 | INTRODUCTION

Hip arthroplasty is performed very commonly worldwide with more than one million operations carried out every year (Judd et al., 2014; Shan, Shan, Graham, & Saxena, 2014). It provides a long-term, secure, and effective solution in reducing pain and restoring function (Nagai, Ikutomo, Yamada, Tsuboyama, & Masuhara, 2014; Slaven, 2012; Trudelle-Jackson, Emerson, & Smith, 2002). However, with parameters

such as technical outcomes and pain, mobility, and physical function, only surgical success can be assessed. These results can not reflect the patient's post-operative situation clearly. Therefore, patient-based assessments have gained importance recently (Šantić, Legović, Šestan, Jurdana, & Marinović, 2012; Shan et al., 2014). One of the most important of these is patient-reported health-related quality of life (HRQoL), which has been reported to be used in a research and clinical practice setting (Bagarić et al., 2014). HRQoL is an indicator of general well-

being and also an important parameter in health services for a patient (Lin, Chang, Lee, Yang, & Tsauo, 2015).

In hip arthroplasty patients, decrease in joint function and muscle strength increases risk for falling, and patients might experience fear of falling during activities of daily living (ADL) resulting from permanent impacts on joint function (Lugade, Klausmeier, Jewett, Collis, & Chou, 2008; Nagai et al., 2014). Investigation of the relationship of these parameters with HRQoL may be important in terms of improving quality of life. In the literature, the relation between HRQoL and functional status has been assessed in patients with hip arthroplasty (Mariconda, Galasso, Costa, Recano, & Cerbasi, 2011). However, to our knowledge, there is no study evaluating the relation of quality of life to fall risk and fear. This study, therefore, was aimed to investigate the relation of HRQoL to functional status, risk of falling, and fear of falling in hip arthroplasty patients.

2 | METHODS

2.1 | Study design

This was a cross-sectional study. Patients who underwent hip arthroplasty surgery between 2010 and 2014 were called, and those who agreed to participate in the study were evaluated. The study protocol was approved by the Institutional Review Board (60116787-020/49571). Written informed consent of patients was obtained before the study was conducted.

2.2 | Participants

This study included 45 patients who aged between 33 and 79 (53.56 ± 12.50) years and volunteered to participate in this study. Patients who had undergone revision surgery and had vestibular, neurological, psychological, or cognitive disorders were excluded.

Based on an a priori power analysis, it was determined that a sample size of at least 69 participants was required to observe a medium between groups effect size (Cohen's $f = 0.30$) with an alpha level of 0.05 and power of 0.80 (Faul, Erdfelder, Lang, & Buchner, 2007).

2.3 | Procedure

The same physiotherapist assessed the patients, and all assessments lasted about an hour for each participant. Descriptive data of the patients (age, gender, body mass index, marital status, education status, and occupation; diagnosis, history, medication, habits, operation information, post-operative weight-bearing condition, etc. in the context of their medical history) were recorded by a preliminary form.

Pain and satisfaction levels were evaluated by Visual Analogue Scale (VAS). Perceived pain levels were investigated during sleeping, resting, and activity (Huskisson, 1974; McCormack, David, & Sheather, 1988).

HRQoL was assessed by the Turkish version of the Nottingham Health Profile. This questionnaire, which questions the perceived

physical, emotional, and social health condition, consisted of 38 yes-no questions with six subtitles: energy level, pain, emotional reaction, social isolation, sleep, and physical activity. The overall score was calculated separately for each parameter, and then, the Nottingham Health Profile total score was obtained from the sum of the scores of these six parameters. In this study, the total score was used (Tarsuslu, Yümin, Oztürk, & Yümin, 2010).

Harris Hip Score (HHS) was used to assess functional status of hip joint. HHS is a 10-point scale consisting of the sections of pain, function, deformity status, and range of joint motion. The maximum score of the scale is 100. The scores are categorized in the following ways: 0–40 refers to bad, 41–60 refers to medium, 61–70 refers to good, 71–85 refers to very good, and 86–100 refers to perfect (Küçükdeveci, 2011).

The Turkish version of Performance-Oriented Motion Assessment I was employed in assessment of risk of falling. It consists of two categories: balance and walking tests. The balance score consists of nine questions with a total maximum score of 16. The walking score consists of eight questions with a total maximum score of 12. The total score of this scale is 28. The scores between 25 and 28 are considered low; the scores between 19 and 24 are considered medium, and the scores below 19 refer to high risk of falling (Yücel et al., 2012).

Patients' fear of falling was assessed by Falls Efficacy Scale. It has a total number of 10 questions. The scores of the questions range from 1 (*I trust completely*) to 10 (*I do not trust at all*). The scale questions self-confidence of patients concerning their performance during ADL without falling (Tuncay, Özdiñçler, & Erdinçler, 2011).

The chair stand test evaluates lower body strength, in addition to ability to sit on a chair and stand from it. In this test, the cases were requested to stand up from a 43-cm-high chair, while they were in sitting position, with their arms crossed in front of the body. The number of repetitions in 30 s was recorded (Bennell, Dobson, & Hinman, 2011).

During 40-m walk test, the patients were asked to walk 40-m distance in a comfortable speed and in a secure way; the results were recorded in seconds (Bennell et al., 2011).

On stair-climb tests, patients were asked to ascend and descend nine steps (step height 20 cm). The duration was recorded in seconds (Bennell et al., 2011).

During single leg stance test, patients were evaluated when their eyes were open, their arms were free, and barefooted standing on the affected extremity (Ceceli et al., 2007). Timing began when untested extremity was elevated. Test was ended in situations such as displacement of the fixed extremity, elevated extremity's contact with the ground or the possibility of fall, and duration was recorded in seconds.

All patients were included in the early physiotherapy programme on the first post-operative day. Inpatient physiotherapy programme consisted of patient education about precautions, exercise training, and mobilization. All patients were discharged with home exercise programme and were called to the clinic for physiotherapy control every 2 weeks, until the post-operative third month.

TABLE 1 Demographic characteristics and medical history of the patients

	Mean ± SD (min.–max.)
Body weight (kg)	75.60 ± 12.00 (50–115)
Height (m)	1.63 ± 0.08 (1.50–1.78)
BMI (kg/m ²)	28.50 ± 4.02 (19.78–42.24)
Rehabilitation process	
Inpatient physiotherapy time (day)	8.97 ± 2.69 (5.0–19.0)
Time to start post-operative mobilization (day)	2.51 ± 0.89 (1.0–5.0)
	n (%)
Preoperative diagnosis	
Coxarthrosis	31 (64.6)
Avascular necrosis of the femoral head	7 (14.6)
Developmental hip dysplasia	10 (20.8)
Rehabilitation process	
Inpatient physiotherapy and home programme	45 (100.0)
Extremity dominance	
Right	45 (100.0)
Affected side	
Right	25 (55.6)
Left	17 (37.8)
Bilateral	3 (6.6)

Note. SD: standard deviation; BMI: body mass index.

Data acquired from participants were recorded in Statistical Package for Social Sciences version 18.0 for Windows. Mean and standard deviation were calculated for descriptive data, which were determined through measurements whereas numbers and percentage value were presented for descriptive data that were determined by counting. In analysing the relationship between HRQoL and fear of falling, risk of falling, and functional status, Pearson correlation analysis was employed. The level of significance was considered as $p < 0.05$.

3 | RESULTS

Twenty-seven of the participating cases were females (60.0%), and 18 of them were males (40.0%). Forty-eight hips of 45 patients with cementless total hip arthroplasty were evaluated 87.10 ± 45.22 (22.43–214.71) weeks after the operation. Descriptive features and medical information of the cases were presented in Table 1.

In terms of the mobility status of cases, in early post-operative period, 44 patients (91.6%) started full, 3 patients (6.3%) partial, and 1 patient (2.1%) touchdown weight-bearing. They reached full weight-bearing 90.80 ± 126.38 (10–900) days after the operation. Three patients (6.3%) continued to use walking sticks as walking aids. In addition, 9 cases defined pain during sleep, 8 during rest, and 28 during walking, and pain level was moderate on VAS as seen in Table 2.

TABLE 2 Values of perception of pain, satisfaction levels, fear of falling, risk of falling, health-related quality of life, and functional status of the patients

	Mean ± SD (min.–max.)
Pain perception (VAS)	
During sleep	4.93 ± 2.76 (1.8–8.3)
During rest	5.34 ± 2.00 (2.5–8.8)
During walking	4.67 ± 2.33 (1.4–9.1)
Patient satisfaction level	9.68 ± 1.07 (4.8–10.0)
FES score	20.90 ± 19.50 (10–99)
POMA-I total score	24.02 ± 4.80 (8–28)
HHS total score	79.54 ± 16.90 (0.08–96.08)
NHP total score	175.57 ± 111.80 (12.6–476.4)
Functional performance tests	
Chair stand test (repetition/30 s)	9.00 ± 2.12 (4–14)
40-m walk test (seconds)	43.70 ± 11.87 (12.3–90.1)
Stair climb test (seconds)	19.45 ± 12.00 (9.0–78.0)
Single leg stance test (seconds)	8.82 ± 9.20 (0.9–41.9)
	n (%)
POMA-I fall risk category	
Low	31 (68.9)
Moderate	8 (17.8)
High	6 (13.3)
HHS category	
Poor	1 (2.1)
Fair	5 (10.4)
Good	1 (2.1)
Very good	21 (43.8)
Excellent	20 (41.6)

Note. FES: Falls Efficacy Scale; POMA-I: Performance-Oriented Motion Assessment I; HHS: Harris Hip Score; NHP: Nottingham Health Profile; s: seconds; VAS: Visual Analogue Scale.

Results concerning perception of pain, satisfaction levels, fear of falling, risk of falling, HRQoL, and functional status of the cases on post-operative period and the relationship between HRQoL and fear of falling, risk of falling, and functional status are presented in Tables 2 and 3, respectively.

TABLE 3 The relationship between functional status of hip joint and fear of falling, risk of falling, quality of life, and functional performance tests

	Parameters	r	p ^a
NHP score	FES score	0.131	0.390
	POMA-I score	-0.589	0.000
	HHS	-0.256	0.000
Functional performance tests			
	Chair stand test (repetition/30 s)	-0.351	0.021
	40-m walk test (seconds)	0.520	0.000
	Stair climb test (seconds)	0.377	0.017
	Single leg stance test (seconds)	-0.226	0.155

Note. NHP: Nottingham Health Profile; FES: Falls Efficacy Scale; POMA-I: Performance-Oriented Motion Assessment I; HHS: Harris Hip Score.

Bold entries were used to show statistical significance.

^aPearson correlation analysis was used.

4 | DISCUSSION

In this study, important parameters such as fear and risk of falling, and functional status, which affect HRQoL, were assessed. Risk of falling, function of the hip joint, and functional performance were found to be correlated with HRQoL. Although short-term HRQoL is reported to be good after hip arthroplasty in the literature, the knowledge of factors concerning HRQoL plays an important role in determination of patients' needs (Rat et al., 2010; Shan et al., 2014).

Fear of falling is a common problem that is observed among geriatrics and directly restricts certain ADLs in older adults. It has been well investigated in older people, but little is known about it after hip arthroplasty (Nagai et al., 2018; Nagai et al., 2014). Additionally, because there is limited study investigating relationship between fear of falling and HRQoL after hip arthroplasty, examining the relationship between these parameters is important. The assessment of patients' fear of falling is significant in prevention strategies for functional disability, which may affect the HRQoL of the patient. Nagai et al. (2014) concluded that fear of falling was associated with poor functional outcome after total hip arthroplasty. In addition, fear of falling is reported as a risk factor leading to activity limitations in older individuals (Nagai et al., 2018). In our study, there was no correlation between fear of falling and HRQoL. However, the level of fear of falling was low. Good functional status seen in the majority of cases may support this result. The low mean age of the cases was a favourable condition for fear of falling. However, due to the wide range of age, it was not possible to make a definite comment on the age factor when discussing this relationship.

Ikutomo, Nagai, Nakagawa, and Masuhara (2015) reported that 77 out of 214 posttotal hip arthroplasty patients had fallen at least once in the past year, and the incidence of falls was 36%. This result indicates that the evaluation of the risk of falling in patients with hip arthroplasty is important. In our study, the risk of falling assessed by Performance-Oriented Motion Assessment I was low in most cases. One of the most important findings of this study is the relationship between quality of life and risk of falling. It is also important to know the risk of falling depending on the relation of quality of life, especially with physical function, social, and occupational participation. The result obtained in this study also suggests that the risk of falling associated with balance and walking skills should be taken into account in improving the quality of life.

This research demonstrated that function of the hip joint was associated with quality of life, which might be the result of good functional status in HHS despite moderate level of pain, high satisfaction level, lower scores at fear of falling, and risk of falling. This result indicated that improvement of patients' functional status might result in increase of quality of life. Mariconda et al.'s (2011) research findings support our results. These researchers assessed quality of life and function and emphasized that hip function is the major determinant of HRQoL, particularly its physical component. In addition, radiographic, range of joint motion, and self-reported measures may not be sufficient to define functional mobility. For this reason, the use of physical performance tests provides information to define patients who are under risk for

limited functional mobility (Judd et al., 2014; Slaven, 2012). In our study, the most relevant performance tests with ADL were used, and it was seen that functional performance was related to quality of life (except single leg stance). This result shows that in addition to hip function, it is important to evaluate activities such as standing up from chair, walking, and climbing stairs, which are important in everyday life, together with quality of life in patients with hip arthroplasty. Besides all these, different preoperative diagnoses of the cases and assessment in different post-operative periods were disadvantageous situations for comments on the functional status.

As a result of this study, it was observed that HRQoL was related to risk of falling and functional status. This result is important for knowing the parameters to be considered for improving the HRQoL in patients after hip arthroplasty. Finally, we can conclude that evaluation of the patients with a holistic approach taking into account patient satisfaction, ADL, occupational, and social activities could help to guide intervention strategy. However, further studies with homogeneity in important variables that may affect the functional status such as preoperative diagnosis, evaluation time, and age are necessary for a clearer interpretation of the obtained results.

4.1 | Limitations

The different post-operative periods of the cases included in the study negatively affected the interpretation of the results. Assessment of patients at the same post-operative period can lead to clearer conclusions. In addition, making follow-up evaluations of the cases at different times may provide great benefits in terms of verifying the results obtained.

4.2 | Implications for physiotherapy practice

In patients with hip arthroplasty besides reduction in functionality, an increase in risk of falling and fear of falling may adversely affect the quality of life. Therefore, evaluation of these parameters is important in order to know the factors affecting the quality of life.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

- Bagarić, I., Šarac, H., Borovac, J. A., Vlasković, T., Bekavac, J., & Hebrang, A. (2014). Primary total hip arthroplasty: Health related quality of life outcomes. *International Orthopaedics*, 38(3), 495–501. <https://doi.org/10.1007/s00264-013-2142-8>
- Bennell, K., Dobson, F., & Hinman, R. (2011). Measures of physical performance assessments: Self-paced walk test (SPWT), stair climb test (SCT), six-minute walk test (6MWT), chair stand test (CST), timed up & go (TUG), sock test, lift and carry test (LCT), and car task. *Arthritis Care & Research*, 63(S11), S350–S370. <https://doi.org/10.1002/acr.20538>

- Ceceli, E., Kocaoğlu, S., Güven, D., Okumuş, M., Gökoğlu, F., & Yorgancıoğlu, R. (2007). The relation between balance, age and functional status in geriatric patients. *Turkish Journal of Geriatrics*, 10(4), 169–172.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. <https://doi.org/10.3758/BF03193146>
- Huskisson, E. C. (1974). Measurement of pain. *The Lancet*, 304(7889), 1127–1131. [https://doi.org/10.1016/S0140-6736\(74\)90884-8](https://doi.org/10.1016/S0140-6736(74)90884-8)
- Ikutomo, H., Nagai, K., Nakagawa, N., & Masuhara, K. (2015). Falls in patients after total hip arthroplasty in Japan. *Journal of Orthopaedic Science*, 20(4), 663–668. <https://doi.org/10.1007/s00776-015-0715-7>
- Judd, D. L., Dennis, D. A., Thomas, A. C., Wolfe, P., Dayton, M. R., & Stevens-Lapsley, J. E. (2014). Muscle strength and functional recovery during the first year after THA. *Clinical Orthopaedics and Related Research*, 472(2), 654–664. <https://doi.org/10.1007/s11999-013-3136-y>
- Küçükdeveci, A. A. (2011). Functional assessment measures in osteoarthritis. *Turkish Journal of Geriatrics*, 14(2), 37–44.
- Lin, S. I., Chang, K. C., Lee, H. C., Yang, Y. C., & Tsauo, J. Y. (2015). Problems and fall risk determinants of quality of life in older adults with increased risk of falling. *Geriatrics & Gerontology International*, 15(5), 579–587. <https://doi.org/10.1111/ggi.12320>
- Lugade, V., Klausmeier, V., Jewett, B., Collis, D., & Chou, L. S. (2008). Short-term recovery of balance control after total hip arthroplasty. *Clinical Orthopaedics and Related Research*, 466(12), 3051. <https://doi.org/10.1007/s11999-008-0488-9-3058>.
- Mariconda, M., Galasso, O., Costa, G. G., Recano, P., & Cerbasi, S. (2011). Quality of life and functionality after total hip arthroplasty: A long-term follow-up study. *BMC Musculoskeletal Disorders*, 12(1), 222. <https://doi.org/10.1186/1471-2474-12-222>
- McCormack, H. M., David, J. D. L., & Sheather, S. (1988). Clinical applications of visual analogue scales: A critical review. *Psychological Medicine*, 18(4), 1007–1019. <https://doi.org/10.1017/s0033291700009934>
- Nagai, K., Ikutomo, H., Tagomori, K., Miura, N., Tsuboyama, T., & Masuhara, K. (2018). Fear of falling restricts activities of daily living after total hip arthroplasty: A one-year longitudinal study. *Clinical Gerontologist*, 41(4), 308–314. <https://doi.org/10.1080/07317115.2017.1364682>
- Nagai, K., Ikutomo, H., Yamada, M., Tsuboyama, T., & Masuhara, K. (2014). Fear of falling during activities of daily living after total hip arthroplasty in Japanese women: A cross-sectional study. *Physiotherapy*, 100(4), 325–330. <https://doi.org/10.1016/j.physio.2013.10.006>
- Rat, A. C., Guillemin, F., Osnowycz, G., Delagoutte, J. P., Cuny, C., Mainard, D., & Baumann, C. (2010). Total hip or knee replacement for osteoarthritis: Mid-and long-term quality of life. *Arthritis Care & Research: Official Journal of the American College of Rheumatology*, 62(1), 54–62. <https://doi.org/10.1002/acr.20014>
- Šantić, V., Legović, D., Šestan, B., Jurdana, H., & Marinović, M. (2012). Measuring improvement following total hip and knee arthroplasty using the SF-36 Health Survey. *Collegium Anthropologicum*, 36(1), 207–212.
- Shan, L., Shan, B., Graham, D., & Saxena, A. (2014). Total hip replacement: A systematic review and meta-analysis on mid-term quality of life. *Osteoarthritis and Cartilage*, 22(3), 389–406. <https://doi.org/10.1016/j.joca.2013.12.006>
- Slaven, E. J. (2012). Prediction of functional outcome at six months following total hip arthroplasty. *Physical Therapy*, 92(11), 1386–1394. <https://doi.org/10.2522/ptj.20110484>
- Tarsuslu, T., Yümin, E. T., Oztürk, A., & Yümin, M. (2010). The relation between health-related quality of life and pain, depression, anxiety, and functional independence in persons with chronic physical disability. *Agri: Agri (Algoloji) Derneği'nin Yayın Organidir= the Journal of the Turkish Society of Algology*, 22(1), 30–36.
- Trudelle-Jackson, E., Emerson, R., & Smith, S. (2002). Outcomes of total hip arthroplasty: A study of patients one year postsurgery. *Journal of Orthopaedic & Sports Physical Therapy*, 32(6), 260–267. <https://doi.org/10.2519/jospt.2002.32.6.260>
- Tuncay, S. U., Özdiñçler, A. R., & Erdinçler, D. S. (2011). The effect of risk factors for falls on activities of daily living and quality of life in geriatric patients. *Turkish Journal of Geriatrics*, 14(3), 245–252.
- Yücel, S. D., Şahin, F., Doğu, B., Şahin, T., Kuran, B., & Gürsakal, S. (2012). Reliability and validity of the Turkish version of the Performance-Oriented Mobility Assessment I. *European Review of Aging and Physical Activity*, 9(2), 149–159. <https://doi.org/10.1007/s11556-012-0096-2>

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