

Comparison Of Patient Self-Report And Surgeon Assesment Of Outcomes In Postoperative Intertrochanteric Fractures Using Modified Harris Hip Score: A Prospective Cross-Sectional Analysis

Prajwal Anand Srinivasan

MS Orthopaedics, Dr.Rajendra Prasad Government Medical College, Tanda, Himachal Pradesh, India;

Vipin Sharma

Professor and Head of Department of Orthopaedics, Dr.Rajendra Prasad Government Medical College, Tanda,
Himachal Pradesh, India

Rishabh Bansal

MS Orthopaedics, Dr.Rajendra Prasad Government Medical College, Tanda, Himachal Pradesh, India

Brandon Eric Dkhar

MS Orthopaedics, Dr.Rajendra Prasad Government Medical College, Tanda, Himachal Pradesh, India

Harshita Udiwal

MS Orthopaedics, Dr.Rajendra Prasad Government Medical College, Tanda, Himachal Pradesh, India

ABSTRACT

Background: Functional assessment post interventions using Modified Harris Hip score evaluated on clinical follow-up has been commonly researched upon. In this post pandemic era, an alternative has been sought after such as patient reported formats which can be done from one's place of comfort avoiding frequent hospital visits. The purpose of this study is to assess the possibility of the use of a patient related format as an alternative to assess functional outcomes.

Methods: A cross analytical approach was used to study 125 participants of which those who were below 20 or above 90 years of age, did not give consent to the study or could not be classified among AO 31A2-31A3 fracture patterns were excluded from the study. A Patient reported mHHS format was prepared by translating each clause of the standard mHHS into easy comprehensible formats. Evaluations were made at 2 weeks, 3 months and 6 months intervals..

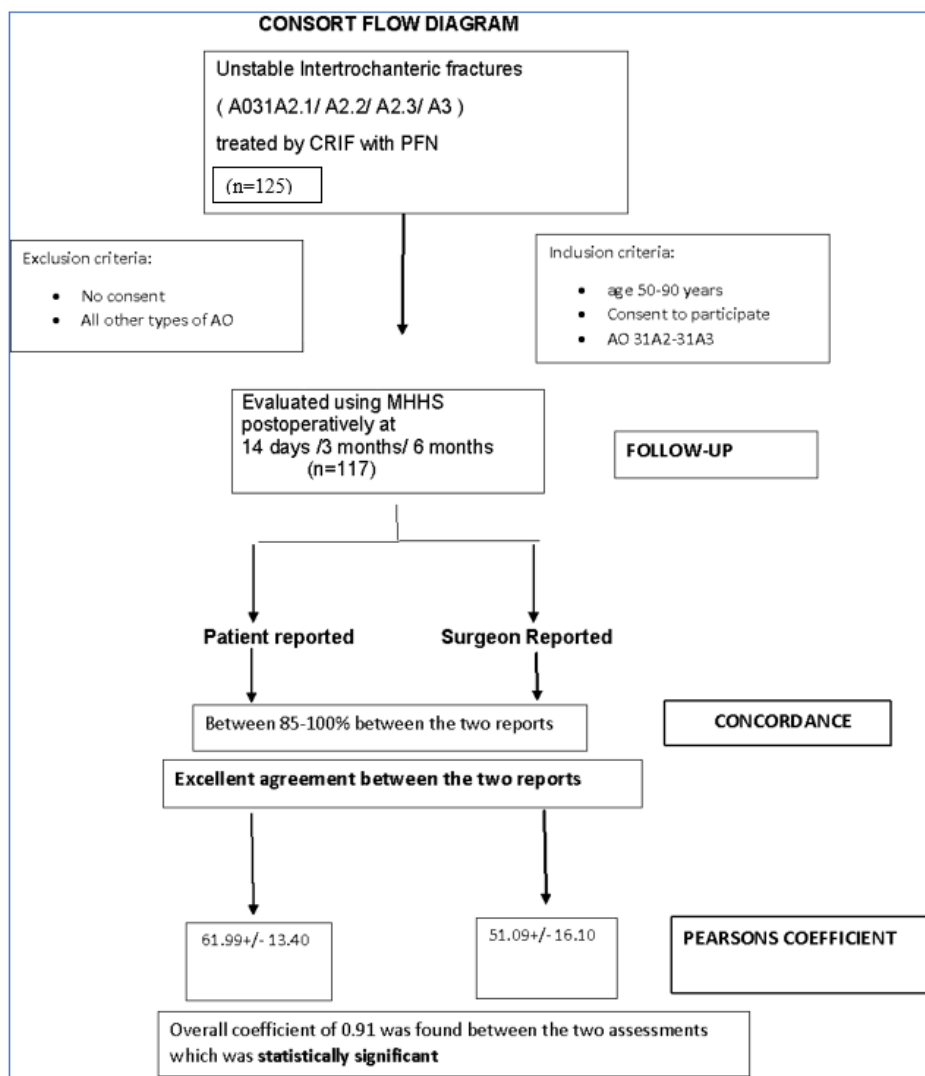
Results: The concordance rate between patient self-report and surgeon-assessed items ranged from 85% to 100% with values for the kappa statistic ranging between 0.72 and 1.00 ($P < 0.001$) denoting excellent agreement between the patient-report and surgeon-assessed formats. Also, the Pearson's correlation was found to be 0.92 between the two types of assessment which was statistically significant indicating good agreement.

Conclusion: A patient reported format of mHHS can be effectively used for assessing functional outcome of patients, post hip fractures, over surgeon reported outcomes and should be given a higher preference due to the additional advantages that it provides such as ease of administration, better compliance and reporting by the patient, even from comfort of his/her home using audio-visual aids especially in the post pandemic era.

Keywords: Modified Harris Hip Score (mHHS), Proximal femoral nail (PFN), Patient related, Surgeon related, Concordance rate, Pearson Coefficient.

Date of Submission: 23-04-2023

Date of Acceptance: 05-05-2023



CONSORT FLOW DIAGRAM

I. INTRODUCTION

Intertrochanteric fractures are defined as extracapsular fractures of the proximal femur that occur between the greater and lesser trochanter.¹ Intertrochanteric fracture is one of the most common fractures of the hip especially in the elderly with porotic bones, usually due to low-energy trauma like simple falls. The incidence of intertrochanteric fracture is rising because of increasing number of senior citizens with osteoporosis with 90% occurring in elderly secondary to trivial trauma.² By 2040 the incidence is estimated to be doubled.

Outcome of the treatment of these fractures vary depending upon the implant, the surgical technique, the type of fixation, the biomaterials, the patient’s age, and numerous other factors. Irrespective of the type of fracture and nature of surgery, early mobilisation of patient is of paramount importance to avoid complications such as bed sores, Renolithiasis and overall catabolic state due to prolonged immobilisation. Exercises performed with weight bearing, certainly following the weight-bearing restrictions set by the physician in charge, have shown themselves to be advantageous and have also increased dynamic balance as well as functional performance.^{3,4}

Outcome measurements such as the HHS are used to test whether treatment is effective in improving function of the patient but is subjected to variability in content validity as per use.⁵⁻⁶ To minimise this variability, Modified HHS (Table 1) was developed in which the clinical evaluation part was removed. Modified HHS has been used in the past to assess functional outcome of THR over telephone⁷ and for assessing functional outcome in non-traumatic indications of THR. Some studies done on patients post arthroplasty using Modified HHS have shown good reliability and validity of the score in assessing the functional status of patient’s post-surgery.⁸ Patient related questionnaires: A more effective format?

In addition to Surgeon related questionnaires, Patient related questionnaires are popular by virtue of their ease of application through audio visual aids ⁶ and have reliability, validity and sensitivity, the only disadvantage being their subjectivity. They are an accepted method of evaluating patient outcomes and quality of life. This methodology has been shown to be reliable, valid, and sensitive in evaluating outcomes of THA.⁹⁻¹⁰ Relative advantage of one category of questionnaire over other has been a matter of debate and discussed in literature at times. We have tried to address this issue by assessing postoperative outcome of unstable trochanteric fractures using mHHS and its patient reported variant (developed by us) (Table 2).

Table 1: MODIFIED HARRIS HIP SCORE (SURGEON RELATED)	
Pain	
None/ignores	(44 points)
Slight, occasional, no compromise in activity	(40 points)
Mild, no effect on ordinary activity, pain after activity, uses aspirin	(30 points)
Moderate, tolerable, makes concessions, occasional codeine	(20 points)
Marked, serious limitations	(10 points)
Totally disabled	(0 points)
Limp	
None	(11 points)
Slight	(8 points)
Moderate	(5 points)
Severe unable to walk	(0 points)
Support	
None	(11 points)
Cane, long walks	(7 points)
Cane, full time	(5 points)
Crutch	(4 points)
2 canes	(2 points)
2 crutches	(1 point)
Unable to walk	(0 points)
Distance Walked	
Unlimited	(11 points)
6 blocks	(8 points)
2-3 blocks	(5 points)
Indoors only	(2 points)
Bed and chair	(0 points)
Stairs	
Normally	(4 points)
Normally with banister (railing)	(2 points)
Any method	(1 points)
Not able	(0 points)
Put on socks/shoes	
With ease	(4 points)
With difficulty	(2 points)
Unable	(0 points)
Sitting	
Able to sit cross legged	(5 points)
High chair, ½ hour	(3 points)
Unable to sit, ½ hour, any chair	(0 points)
Enter public transportation	
Able to enter public transportation	(1 points)
Unable to use public transportation	(0 points)
Score	
>90 = excellent	
80-80 = good	
70-79 = fair	
60-69 = poor	
<60 = very poor	
TOTAL MODIFIED HARRIS HIP SCORE: _____	

II. METHODOLOGY

This is a prospective cross-sectional analytical study of 125 intertrochanteric fracture fixations followed up post operatively upto 6 months. Data was collected among individuals operated for intertrochanteric fractures with

PFN over a period of two years (from 2019-2021). They were followed up in 14-day, 3 month and 6 monthly intervals post-surgery by a single surgeon. 8 patients were lost to follow-up during this period.

Patients who were below 20 or above 90 years of age, did not give consent to the study or could not be classified among AO 31A2-31A3 were excluded from the study.

Table 2 : MODIFIED HARRIS HIP SCORE (PATIENT RELATED)

HOW ARE YOU ABLE TO TOLERATE YOUR PAIN AFTER SURGERY?	
Not at all or ignorable	(44 points)
Slight pain but able to do all activity as normal	(40 points)
Mild, pain after doing some work, uses medication	(30 points)
Moderate pain, tolerable but interferes with activity	(20 points)
Marked, not able to do most of the work done preoperatively	(10 points)
Not able to do any work at all	(0 points)
HOW CAPABLE ARE YOU OF WALKING NORMALLY?	
Normal walk	(11 points)
Slight difficulty in walking	(8 points)
Moderate difficulty in walking	(5 points)
Severe limp, unable to walk	(0 points)
DO U NEED ANY DEVICE TO HELP U WALK?	
None	(11 points)
Cane needed only for long walks	(7 points)
Cane needed full time to walk	(5 points)
Crutch needed to walk	(4 points)
2 canes needed	(2 points)
2 crutches needed	(1 point)
Unable to walk	(0 points)
HOW MUCH DISTANCE ARE U ABLE TO COVER?	
Unlimited	(11 points)
6 blocks	(8 points)
2-3 blocks	(5 points)
Indoors only	(2 points)
Bed and chair	(0 points)
HOW DIFFICULT IS IT FOR YOU TO CLIMB STAIRS?	
Normally able to climb like before	(4 points)
Able to climb with railing only	(2 points)
Need some support always to walk	(1 points)
Not able to climb stairs at all	(0 points)
ARE YOU ABLE TO PUT ON SOCKS/ SHOES	
Able to easily do it	(4 points)
Find difficulty in putting them on	(2 points)
Unable to put on socks or shoes	(0 points)
HOW CAPABLE ARE YOU OF SITTING ON A CHAIR?	
Able to sit cross legged	(5 points)
High chair for ½ hour	(3 points)
Unable to sit at all	(0 points)
ARE U ABLE TO USE ANY PUBLIC TRANSPORTATION	
Able to enter public transportation	(1 points)
Unable to use public transportation	(0 points)
Score	
>90 = excellent	
80-80 = good	
70-79 = fair	
60-69 = poor	
<60 = very poor	
TOTAL MODIFIED HARRIS HIP SCORE: _____	

In the present study of postoperative unstable intertrochanteric fractures, a variant of Modified HHS was developed by translating each clause of the mHHS score into a patient reported instrument. The resultant patient reported mHHS score sheet was assessed by two senior faculty members independently. On agreement of opinion of two senior faculty members regarding each clause of the variant formed, it was finalised and taken as patient reported Modified HHS format. The patient-reported questionnaires consisted of questions regarding pain,

support, limp, distance walked, climbing stairs, wearing socks and shoes, sitting, using public transportation, similar to the surgeon format, but following easy comprehension.

All patients were surveyed by handing them questionnaires before the surgeons review on the same day as the appointment. Once the patient completed his questionnaire, an orthopaedic surgeon who was unaware of the responses evaluated the patient using the surgeon reported mHHS format.

Since Modified Harris Hip score requires only observational data, no clinical tests were performed. Also, this allowed many of the patient-assessments to be done virtually as well as the covid pandemic hindered clinical follow-ups . The parameters set were that a score of 90 or above indicated excellent rehabilitation and a score of 60 or below indicated poor rehabilitation.

Concordance and coefficient rates were calculated between these two formats respectively.

Statistical analysis

The data were entered in MS excel sheet and appropriate statistical tests were applied. Patients were evaluated using both formats at set points of time such as 14th post operative day ,3 month and 6month follow-up. The quantitative variables were expressed as mean +/- SD and compared using kappa value and Pearson's coefficient. Concordance values were obtained between the two scores to tests the significance between the scores. The P-value was considered to be significant when found to be less than 0.05.

III. RESULT

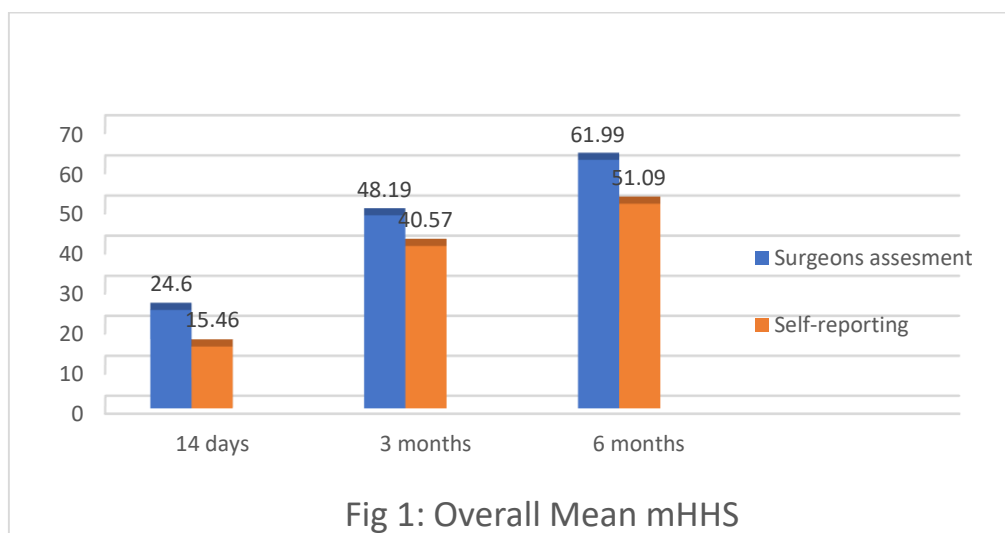
There were 125 study participants in our study comprising of 64 males and 61 females, with a male to female ratio of 1.05. The mean age of the study participants was 66.35±19.04 years and the mean duration of surgery from the time of admission was 5.61±4.74 days.

On studying the fracture pattern, 61 study participants suffered from Closed# intertrochanteric right femur, whereas 64 study participants suffered from Closed# intertrochanteric left femur. 109 study participants suffered from AO 31A2 fractures, whereas the rest suffered from AO 31A3 type of fractures. All patients underwent fixation with cephalomedullary nails.

On evaluating the type of implant used based on patients condition, femoral bowing, and fracture pattern, it was found that long Proximal femoral nail were used in 58 study participants(46%), whereas short proximal femoral nail were used in 67 study participants(54%).

Firstly, the modified HHS was self-assessed by the patient postoperatively using respective format, values of which are depicted in the table below. The overall mean score increased from 15.46 to 51.09 at the end of 6 months after the surgery. (Table 3).

Secondly, the modified HHS was assessed by the surgeon postoperatively using the surgeons mHHS format. The overall mean score increased from 24.60 to 61.99 at the end of 6 months after the surgery. (Table 3). The overall mean scores changing from day 14 of follow-up through 6 months of follow up for both the types of assessments is mentioned in Figure 1.



We did a sub-group analysis of the patients after excluding those who either died or were lost to follow up. Out of a sample size of 125 patients, 117 participants were analysed. 8 patients were lost to follow-up out of which 3 patients died during the study period.

The values obtained from patient's patient-report assessment and surgeon assessment were compared using concordance rates and Pearson's coefficient.

The concordance rate between patient patient-report and surgeon-assessed items ranged from 85% to 100%. The lowest level of agreement occurred for the question regarding transportation (72%). The remaining 7 items had concordance rates >75%, indicating excellent agreement between the 2 formats.

The Kappa statistics evaluate the level of agreement between the 2 methods of administration that exists beyond chance. Values >0.75 indicate excellent agreement and are considered sufficient for most instruments in which group level comparisons are being considered. The values for the kappa statistic for each item of the HHS ranged between 0.72 and 1.00 (P < 0.001). The lowest Kappa value of 0.72 still denotes excellent agreement between the patient-report and surgeon-assessed formats. On evaluation of the Pearson coefficient, a strong correlation between the two scoring formats was found. The Pearson's correlation coefficient varied from as low as 0.13 to as high as 1.00. The overall correlation was found to be 0.92 between the two types of assessment and was statistically significant (p<0.05). The scatter plots of the mean scores between the two formats show linear and good correlation during all three intervals of the study. (Table 3).

(Fig 3)

*p<0.05

Table 3: Individual Harris Hip Score Item Response Comparison Between Patient-Report and Surgeon Assessment (n=125)							
	Score from Surgeon's Assessment		Score from Patient Reporting		Concordance	Kappa Statistic	Pearson's Correlation Coefficient(r)
	MEAN	SD	MEAN	SD			
Pain							
14 days	18.4	9.19	10.32	8.02	88%	0.84	0.88
3 months	29.74	7.93	25.92	4.82	90%	0.88*	0.72
6 months	33.81	5.83	30.89	7.43	90%	0.88*	0.76
Limp							
14 days	1.52	2.30	1.40	2.25	95%	0.92*	0.96
3 months	5.06	1.61	3.86	2.71	90%	0.86	0.56
6 months	6.97	1.43	6.41	2.11	84%	0.81	0.48
Support							
14 days	0.98	0.78	0.68	0.46	74%	0.73	0.76
3 months	2.89	1.51	1.76	1.71	79%	0.76	0.69
6 months	4.65	1.35	2.64	1.57	80%	0.78*	0.67
Distance Walked							
14 days	1.32	0.95	1.02	1.00	88%	0.85*	0.56
3 months	4.74	2.55	2.79	2.64	76%	0.74	0.88
6 months	6.84	3.70	4.04	2.90	81%	0.80	0.84
Stairs							
14 days	0.11	0.32	0.11	0.32	100%	1.00*	1.00
3 months	1.00	0.79	1.15	0.85	95%	0.92*	0.60
6 months	1.88	0.97	1.08	0.85	93%	0.91*	0.72
Shoes							
14 days	0.27	0.69	0.02	0.18	83%	0.80*	0.25
3 months	1.34	0.94	0.72	0.99	79%	0.78	0.51
6 months	2.52	1.06	1.68	1.29	74%	0.72	0.59
Sitting							
14 days	1.94	1.44	1.90	1.45	96%	0.95*	0.79
3 months	2.75	1.92	3.02	1.07	86%	0.83	0.50
6 months	4.34	0.99	3.65	0.98	88%	0.87	0.44
Transportation							
14 days	0.11	0.32	0.01	0.09	74%	0.71	0.25

3 months	0.66	0.48	0.36	0.48	72%	0.70	0.54
6 months	0.97	0.16	0.70	0.46	84%	0.85*	0.92

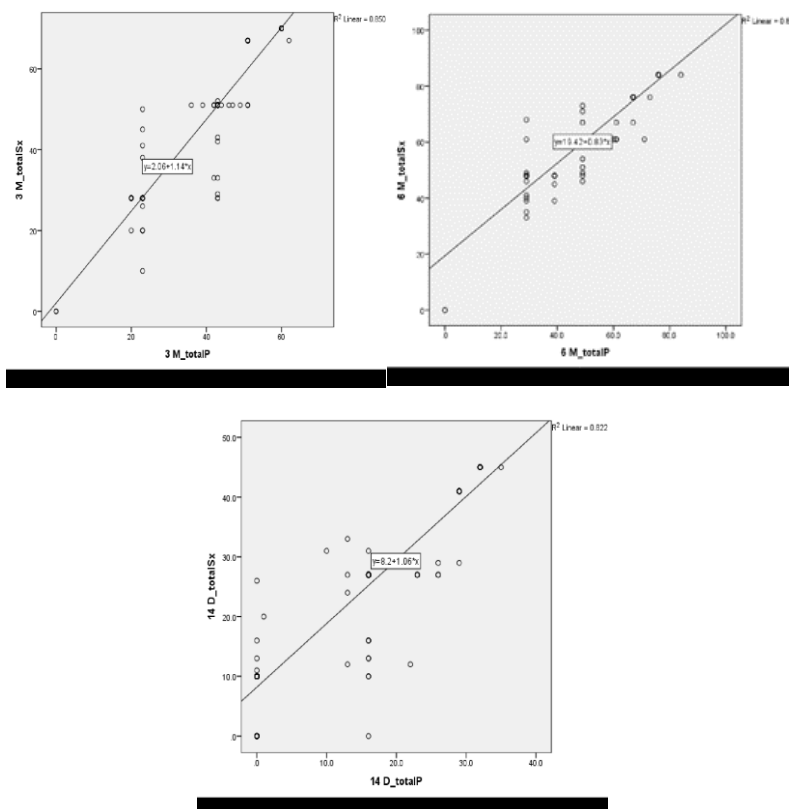


Fig 3: Correlation between the mean scores of Surgeon’s assessment and Patient’s patient-assessment at 14 days, 3 weeks and 6 weeks respectively

IV. DISCUSSION

The Harris Hip score has been widely used as a hip scoring system in literature. It is one of the most commonly studied and used scores in evaluation of functional outcomes in postoperative patients most commonly post THA¹¹⁻¹⁶ The Modified HHS varies from HHS scores in the fact that it excludes clinical evaluation as part of its format, hence increasing patient compliance and ease of comprehension. Some related studies such as the one conducted by Mohamed et al⁹ have assessed Patient reported functional hip scores postoperatively at a point of time for functional assessment without any long-term follow up due to which long term variations between surgeon and patient related assessments could not be measured. They found that patient-based patient-report administration of HHS was easier to comprehend and use by the patients. Results showed concordance rates between patient patient-report and surgeon-assessed items ranging from 85% to 100%. Also, in the same study, the variation in formats (surgeon related and patient related) used in the study have not been elaborated. In the present study, mHHS (surgeon reported and patient reported) were used to assess postoperative functional outcome of unstable trochanteric fractures at 14 days, 3 month and 6 month follow up and comparisons between the two scores have been achieved during these intervals. These comparisons showed a significant improvement in both scores during follow-up with high levels of concordance between both the formats during various periods of follow-up.

Libermann et al assessed outcomes in THA patients and found significant differences between patient and surgeon related assessments in THA, but his study was believed to be flawed as he used visual analog scales which was believed to cause significant subjective variations in interpretation of outcome.⁹⁻¹⁰

Several advantages offered by patient reported mHHS e.g. easier admission by mail survey, evaluation format consistent with contemporary instruments, less expensive than formal surgeon assessment and less burdensome to patients than formal clinical evaluation, have also been mentioned in related studies.^{5-7,9}

In our study, we used multiple choice questions with fixed response categories for mHHS (Patient reported) and found that this pattern minimizes problems of subjective interpretation of the response scales by respondents in relation to the severity of the problem being evaluated. We found the mHHS to be a reliable format to assess functional outcome of unstable fractures postoperatively. This is in similar terms with a study conducted

by Vishwanathan K et al which showed similar results and high reliability of mHHS in assessing functional outcome in postoperative per-trochanteric fractures treated with Proximal Femoral Nail.¹⁷

Our results showed that that the patient-reported mHHS was simple and easy to correlate by patients as indicated by the high concordance (0.72-1.00) between the surgeon and patient related formats of reporting.

Although the correlation coefficients in short term follow-up showed comparatively lower agreement, long term follow-up showed excellent correlation between the two formats with a overall significant value of 0.92.

These factors indicate that patient reported mHHS can be used as an alternative to surgeon reported mHHS and additional advantages with the patient-reported formats, like ease of administration, easy comprehension, active patient participation, better compliance, and reporting by the patient even from comfort of his/her home using audio visual aids makes it a good alternative to clinical evaluations and follow-ups especially post the pandemic.

V. LIMITATIONS OF STUDY

A few patients were lost to follow-up due to ongoing COVID-19 pandemic and reluctance on part of family members to continue participation in the study due to the ongoing pandemic. This limitation was more in case of elderly patients who were more susceptible to the COVID illness. This led to a smaller number of patients enrolling for the study as compared to the number of patients operated in the institution. In view of the above limitations, Patients with and without co-morbidities were both considered in the study to allow for appropriate sample size.

VI. CONCLUSION

The present study was a cross-sectional prospective analysis which was hospital based and was done with the objectives of assessing postoperative Unstable Intertrochanteric fractures using Modified Harris hip score based on a patient's self-report and a surgeon's assessment, and further evaluating and comparing the mHHS scores obtained between the two participants. The final outcome was to see whether patient reported formats can be used as an alternative to surgeon reported systems decreasing the need for clinical evaluation especially in the post pandemic era. We can conclude that the performance of a Patient reported mHHS has been found to be comparable to that of a Surgeon reported mHHS and with the additional advantages like ease of administration, easy comprehension, active patient participation, better compliance and reporting by the patient even from comfort of his/her home using audio-visual aids, it can be effectively used as a alternative approach and should be given a higher preference due to the additional advantages that it provides over surgeon reported outcomes.

BIBLIOGRAPHY

- [1]. Karakus O, Ozdemir G, Karaca S, Cetin M, Saygi B. The relationship between the type of unstable intertrochanteric femur fracture and mobility in the elderly. *J Orthop Surg Res.* 2018;13(1). doi:10.1186/S13018-018-0911-1
- [2]. Yang Y, Lin X. Epidemiological features of 877 cases with hip fracture. *Zhonghua Liu Xing Bing Xue Za Zhi.* 2014;35(4):446-448.
- [3]. Attum B, Pilson H. Intertrochanteric Femur Fracture. *Orthop Traumatol An Evidence-Based Approach.* Published online August 11, 2021:219-231.
- [4]. Sherrington C, Lord SR, Herbert RD. A randomized controlled trial of weight-bearing versus non-weight-bearing exercise for improving physical ability after usual care for hip fracture. *Arch Phys Med Rehabil.* 2004;85(5):710-716. doi:10.1016/S0003-9993(03)00620-8
- [5]. Pynsent PB, Fairbank JCT, Carr AJ, editors. *Outcome measures in orthopaedics and orthopaedic trauma.* 2nd ed. New York: Oxford University Press; 2004.
- [6]. Poolman RW, Swiontkowski MF, Fairbank JC, Schemitsch EH, Sprague S, de Vet HC. Outcome instruments: rationale for their use. *J Bone Joint Surg Am.* 2009 May;91 Suppl 3(Suppl 3):41-9. doi: 10.2106/JBJS.H.01551. PMID: 19411499; PMCID: PMC2669748.
- [7]. Sharma S, Shah R, Draviraj KP, Bhamra MS. Use of telephone interviews to follow up patients after total hip replacement. *J Telemed Telecare.* 2005; 11(4):211-214.
- [8]. Uppal et al Hip fractures: Relevant Anatomy, Classification and Biomechanics of Fracture and Fixation *Geriatr Orthop Surg Rehabil.* 2019 Jul 3; 10: 2151459319859139.
- [9]. Mahomed NN, Arndt DC, McGrory BJ, Harris WH. The Harris hip score: comparison of patient patient-report with surgeon assessment. *J Arthroplasty.* 2001; 16:575-80
- [10]. Lieberman JR, Dorey F, Shekelle P, Schumacher L, Thomas BJ, Kilgus DJ, et al. Differences between patients' and surgeons' evaluations of outcome after total hip arthroplasty. *J Bone Joint Surg Am.* 1996; 78:835-8
- [11]. Fortin PR, Clarke AE, Joseph L, et al: Outcomes of total hip and knee replacement performed in a US and a Canadian referral center: preoperative functional status predicts outcomes at six months after surgery. *Arthritis Rheum* 42:1722, 1999
- [12]. Mahomed NN, Katz JN, Liang MH, et al: The role of patient expectations in predicting functional outcomes and satisfaction with total hip and knee arthroplasty. *Canadian Orthopaedic Association Annual Meeting, Ottawa, Canada, 1998*
- [13]. Mahomed NN, Phillips CB, Fossel AH, et al: Functional health status and satisfaction with outcome in revision arthroplasty. *J Bone Joint Surg Br* 80B:11,1998
- [14]. Landis JR, Koch GG: The measurement of observer agreement for categorical data. *Biometrics* 33:159,1977
- [15]. Cohen J: A coefficient of agreement for nominal scales. *Education Psychology Measures* 20:37, 1960
- [16]. McGrory BJ, Shinar AA, Freiberg AA, et al: Enhancement of the value of hip questionnaires by telephone follow-up evaluation. *J Arthroplasty* 12:340, 1997

- [17]. Vishwanathan K, Akbrari K et al. Is the Modified Harris Hip Score Valid and Responsive Instrument for Outcome Assesment in the Indian Population with Petrochanteric Fractures. JOO. 2018; 15:40-46

ACKNOWLEDGEMENTS

I am truly grateful to the Department of Orthopaedics, Dr Rajendra Prasad Government Medical College, Tanda for their continued support throughout this study.

CONFLICTS OF INTEREST

None of the authors declare any conflict of interest related to this study

Prajwal Anand Srinivasan. et.al.” Comparison Of Patient Self-Report And Surgeon Assesment Of Outcomes In Postoperative Intertrochanteric Fractures Using Modified Harris Hip Score: A Prospective Cross-Sectional Analysis”. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 22(5), 2023, pp. 29-37.