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Patient Perception of Aesthetics, Functional Recovery and Quality of Life after Distal Radius Fracture Treatment: A Cross-Sectional Analysis

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Each author of this article has encountered all 04 criterions of authorship:

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ABSTRACT

Objectives: To evaluate patient-reported functional recovery, aesthetic satisfaction, and quality of life following operative and non-operative treatment of DRFs.

Methodology: An analytical cross-sectional study was conducted at AL-Aleem Medical College, Lahore. Data were collected retrospectively and prospectively from June to December 2024. Patients aged 18 and above, with a minimum follow-up of three months, were included. MHQ-U and SF-36-U were used to assess function, pain, aesthetics, and quality of life.

Results: Among 85 eligible patients, the mean MHQ score was 73.17, indicating good hand function, while the SF-36 score was 68.17, reflecting positive health perception. The aesthetic score of 84.45 highlighted high satisfaction with hand appearance. Operatively treated patients showed significantly better functional outcomes, but aesthetic scores did not differ between groups. Age, hand dominance, and education level were key predictors of PROs.

Conclusion: Both treatments provided satisfactory functional and aesthetic outcomes. Patients generally perceived positive recovery, with surgical treatment offering superior functional improvement. There was high aesthetic satisfaction regardless of treatment type, contributing to an overall improved quality of life. For a better understanding of the durability of these findings, future studies should include long-term follow-up and cohort analysis.

Keywords: Distal Radius Fracture; Quality of life; Michigan Hand Outcomes Questionnaire; Patient Reported Outcome Measures.

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INTRODUCTION

The distal Radial Fracture (DRF) is a relatively frequent injury with a pronounced effect on hand functional ability and quality of life[(1)]. In the United States, a study performed with more than 200,000 patients has considered the radius as the most frequently fractured long bone[(2)]. Distal radius fractures are problematic as they significantly increase the number of visits to hospital emergency departments and account for 25%-50% of the skeletal fractures, which are managed in primary care[(3)].

Among the treatment modalities for DRF are surgical techniques such as open reduction internal fixation (ORIF) and non-surgical ones like closed reduction and casting. The selection of a particular method may differ based on the fracture's severity, the age, and functional requirements of the patient[(4)]. In the past, treatment efficacy was evaluated on both clinical and radiological parameters. Although these measures form important

benchmarks, there is a lack of comprehensive understanding of patient's recovery, highlighting the importance of patient-reported outcomes (PROs)[5]. Qualitative analysis of distal radial fractures' treatment through patient observed outcomes (PROs) is significant due to the reason that patients give critical information regarding pain, function, and satisfaction that cannot be adequately measured by clinical and radiological evaluations. Additionally, outcomes measured from the perspective of patients attest that the treatment administered met the desires and objectives of the patients[6].

There is a range of validated tools available to understand patient-reported outcomes in clinical practice, each one providing a different perspective on how the patient is recovering. In this context, the Michigan Hand Outcomes Questionnaire (MHQ) is a reliable tool that assesses the functional and aesthetic recovery of the hand and wrist injuries. It has been shown to be successful in capturing multifaceted recovery processes. Apart from the MHQ, other instruments like the Short Form 36 (SF-36) are used to assess general health and quality of life. The SF-36 gives a wider view of the patient's quality of life when combined with MHQ, because it measures the impact of wrist injuries on health. The application of the MHQ in conjunction with the SF-36 can give a multidimensional view of recovery, from specific functional outcomes to how one feels in general[7]. Both the MHQ and SF-36 have been translated into Urdu, ensuring their accessibility and validity to the local population in Pakistan[8,9].

The incorporation of Urdu translations of the Michigan Hand Outcomes Questionnaire (MHQ) and the use of SF-36 will improve the capture of patient-reported outcomes (PROs) in Pakistan, making the feedback culturally appropriate and addressing the patients' experiences in an accurate manner. Moreover, there is a limited number of studies conducted in Pakistan that have reported patient-reported outcomes following distal radial fracture treatment. This study aims to achieve this objective by evaluating different patient-reported outcomes (PROs) over a period of three month or more. With the use of appropriate methods, the goal is to better understand the recovery perception in patients towards the functional and cosmetic issues which will enhance the overall care and rehabilitation outcome.

METHODOLOGY

Study Setting and Population

This analytical cross-sectional study underwent in the AL-Aleem Medical College, Lahore, Pakistan. Using hospital records, patients treated for distal radial fractures (DRFs) between June 2024 till December 2024 were identified and selected. Both, operative (open reduction and internal fixation) and non-operative (closed reduction and casting) treatments were included.

Inclusion and Exclusion Criteria

Patients were included if they underwent treatment of a DRF and were 18 years of age and older[5,10] with minimum follow up of three months, patients who were able to complete the questionnaire in Urdu, and those who signed the informed consent. Exclusion criteria were open fractures, bilateral DRFs, other medical conditions that limit wrist function like rheumatoid arthritis, neurovegetative diseases, or associated post-treatment adverse outcomes[10,11].

Patient-Reported Outcome Measures (PROMs)

To assess the patient's perception of aesthetics and functional recovery, the validated Urdu translation of Michigan Hand Outcomes Questionnaire was employed. It is a 37-item self-reported tool divided into six domains namely general hand function, activities of daily living, work performance, pain, aesthetics, and satisfaction. Each domain is scored, except for work performance, with a range between 0 (the worst outcome) and 100 (the best outcome) for individual hand. When pain is assessed, a higher score indicates increased discomfort. For cases when both hands are affected, the domains are averaged. Once the scoring of pain domain is reversed, the total domains scores are added up and the result is divided by 6 to calculate total MHQ scores[12].

The other tool administrated in this study was the Urdu version of SF-36 for assessing the quality of life after distal DRF treatment. The SF-36 is a comprehensive tool that evaluates a person's health-related quality of life (HRQOL) across eight domains: Physical Functioning, Role Limitations Due to Physical Health, Role Limitations Due to Emotional Problems, Pain, Mental Health, Social Functioning, Vitality and the General Health Perceptions. Each domain is scored from 0 to 100, where higher scores indicate better health. The overall SF-36 score is calculated by summing all domain scores and dividing by eight[13].

Data Collection and Follow-Up

Data for this study were collected both retrospectively and prospectively to expand the sample size and extend the study's timeframe for a comprehensive analysis. Eligible patients were contacted through mail and phone, and invited to visit the hospital for data collection procedure, during

which they were provided with MHQ-U and SF-36-U questionnaire to complete. The data collection procedure for non-responders was made possible through follow-up phone calls to ensure their participation in the study. Additional demographic and clinical data, including age, sex, hand dominance, average family income, level of education, and treatment modality were recorded to analyze potential factors influencing outcomes.

Statistical analysis

The statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 25. The data was summed up using descriptive statistics- where means and standard deviations were calculated for continuous variables. Meanwhile, percentages were calculated for categorical variables. An independent samples t-test was performed to assess mean differences of MHQ and SF-36 between the surgical and non-surgical groups. This analysis evaluated whether or not the treatment approach had a statistically significant effect on patient-related outcome measures[14]. In addition, a multiple regression analysis was performed to determine the predictors of patient-related outcomes. Specific demographic factors which should impact outcome were included in the regression model to assess their relative effect on clinical outcome variation[15]. For all the analyses, a P value of less than 0.05 was considered significant.

Ethical considerations and institutional Approval

The IRB of, AL-Aleem Medical College, Lahore, granted ethical approval for this study. Ethical issues relating to informed consent, confidentiality, and patient rights were adequately addressed. The study was designed and executed in a manner that preserved the dignity, safety and health of all participants.

RESULTS

A total of 111 patients who underwent distal radial fracture treatment at the AL-Aleem Medical College, Lahore, Islamabad, Pakistan were identified. Of these, 96 patients met the eligibility criteria. However, 11 patients failed to complete more than 50% of the questionnaire, leaving data available for 85 patients, on whom statistical analysis was performed. The mean age of the patients was 39.36±11.49, with 54 males and 31 females. Among the participants, 44 patients underwent non-operative treatment, while 41 patients received operative treatment.

Table 1: Descriptive Statistics of Demographic Variables

Study variables	Mean ± SD	Frequency (%age)
Age	39.36±11.49	-
Gender	-	
Male		54 (63.5%)
Female		31(31.5%)
Hand dominance	-	
Left		19 (22.4%)
Right		29 (34.1%)
Both		37 (43.5%)
Level of education		
Less than matric		14 (16.5%)
Matric		6 (7.1%)
Technical school		9 (10.6%)
Associate degree		18 (21.2%)
12th class		23 (27.1%)
Professional or graduate		15 (17.6%)
Family income		
10000-19999		3(3.5%)]
20000-29999		18 (21.2%)
30000-39999		17 (20.0%)
40000-49999		19 (22.4%)
50000-59999		7 (8.2%)
60000-69999		9 (10.6%)
70000 or more		12 (14.1%)

Table 2: Descriptive Statistics of Clinical Variables

Study variables	Descriptives
General hand function	75.5±12.80
2-ADLs	
Single hand	74.47±11.57
Both hands	80.32±13.18
3-Work performance	78.94±12.01
4-Pain	38.29±14.40
5-Appearance/Aesthetics	84.45±11.15
6- Satisfaction	84.89±9.30
Total MHQ-U scores	73.17±7.2
Total SF-36-U scores	68.17±7.5
Treatment group	
Non-surgical	44(51.8%)
Surgical	41 (48.2%)

The statistical analysis revealed that the total Michigan Hand Questionnaire (MHQ) score was 73.17, indicating a good level of hand function and satisfaction at 3 months following distal radial fracture treatment. Similarly, the total SF-36 score was 68.17, reflecting an overall positive perception of physical and mental health among the patients. The

aesthetic score was 84.45, highlighting a favorable perception of aesthetics post-treatment.

When comparing the operative and non-operative groups, a statistically significant difference was observed, with the surgical group showing greater improvement in total MHQ scores. Sub-domain analysis revealed that this difference was significant for general hand function, activities of daily living (ADLs), work performance, and satisfaction with hand function. However, no statistically significant difference was found between the groups in terms of pain, appearance, or aesthetics. Similarly, the SF-36 scores showed no statistically significant difference between the two groups.

The multiple regression analysis identified age, hand dominance, and level of education as independent predictors of patient-reported outcomes, with a p-value of <0.05 indicating statistical significance. Conversely, gender and family income were not found to be significant predictors of patient-reported outcomes in this study.

Table 3: Comparison of Clinical Variables between Surgical and Non-Surgical Groups

Study Variables	Non-surgical	Surgical	P value
General hand function	72.38±13.48	77.92±11.50	.04
ADLs			
Single hand	71.70±11.15	77.43±11.40	0.02
Both hands	76.98±12.17	83.90±12.86	0.01
Work performance	76.02±12.13	82.17±11.17	0.01
Pain	37.97±14.27	38.65±14.70	.823
Appearance/Aesthetics	85.39±10.29	83.44±12.01	.423
Satisfaction	80.92±8.85	89.16±7.84	0.001
Total MHQ-U scores	71.17±6.72	75.32±6.78	0.006
Total sf-36 scores	66.93±7.40	69.51±7.28	.114

Table 4: Multiple Regression Analysis of Clinical Outcomes in Relation to Demographic Variables

Study Variables	MHQ Regression coefficient (95% CI)	SF-36 Regression coefficient (95% CI)	P value
Age	-.380(-.335 to -.126)	-.217(-.262 to -.02)	<0.05
Gender	-.108(-4.17 to -1.05)	-.06(-4.03 to 2.03)	>0.05
Hand Dominance	.301(1.06 to 4.2)	.352(1.4 to 5.2)	<0.05
Family income	.045(-.598 to .949)	0.01(-.896 to -.898)	>0.05
Level of education	.379(.823 to 2.32)	.349(.681 to 2.4)	<0.05

DISCUSSION

The objective of this study was to evaluate patient aesthetics, functional recovery and quality of life after management of distal radial fractures. The results indicated that most patients had good functional results and were satisfied with the treatment received. While both treatment options, surgical and non-surgical, worked effectively, the surgical group had more favorable results in terms of hand function, activities of daily living, work performance and satisfaction. Pain relief and aesthetic perception, however, was the same in both groups indicating that the more effective treatment did not result in better pain or cosmetic outcomes. In terms of overall quality of life, there were no significant differences that were noticed, which means both treatment methods help the patient to reach an acceptable level of wellbeing. In addition, multiple regressions showed that age, hand dominance and education level had a statistically significant effect on the outcomes of the patients indicating that individual differences matter in recovery. It was surprising, however, that gender and socio-economic factors had little influence and this means that the patients' intrinsic factors may be more important than the external ones.

The responsiveness of the MHQ was evaluated by Kotsis et al. (2007) in patients who had unstable distal radius fractures treated with open reduction and internal fixation. Three months after treatment,

the researchers discovered that every MHQ domain had greatly improved. The pain, function, and activities of daily living domains had medium Standardized Response Means (SRMs), while the total score and the work domain had large SRMs[16]. Our study results are also comparable with the outcomes of other studies which indicate greater functional recovery in the surgical group post-treatment of distal radius fractures. For example, a recent meta-analysis by Zhao et al (2024) revealed that surgical treatment led to improved hand functioning evaluated through DASH, which is another valid questionnaire to assess hand function, corroborating out finding of greater hand functioning in the surgical group[17]. Gill et al (2023) noted that after treatment of distal radius fractures, patients underwent surgical procedure had a greater recovery in terms of patient reported outcomes after 3 months[18]. Conversely, better functional improvements in patients treated surgically were not observed by Egol et al. (2010). In their study, patients reported no significant change in wrist function at 3, 6, and 12 months between these two groups[19]. Similarly, Bartl et al. (2014) found only a slight difference in function between patients undergoing surgery and those treated nonsurgical at three and twelve months after treatment of DRF[20]. However, the quality of life between both treatment groups was similar in this study, which aligns with our findings and those of Leerdam et al. (2019)[5].

The multiple regression analysis in the our investigation revealed age, hand dominance, and education level as significant predictors of recovery, a finding compatible with the results of Tang et al. (2022) who found that younger age and involvement of the dominant hand were important determinants of functional results in distal radius fracture treatments[21]. Likewise, Hosokawa et al. (2020) noted that recovery of functions was highly dependent on the hand dominance, as patients with dominant hand suffered more[22]. An additional noteworthy finding of our study was that the level of education emerged as an independent predictor of recovery following distal radial fractures. This aligns with the findings of Chung et al. (2019), who observed that patients with a high school education or less reported more severe pain and lower Michigan Hand Outcome Questionnaire (MHQ) scores compared to those with a higher level of education[23].

Overall, it is clear from our study that recovery after a distal radial fracture is complex and differs from one person to the next. Treatment strategies and individual patient factors both play a role in patient reported outcomes. The evaluation of patient-reported outcomes, including aesthetics, functional recovery, and change in quality of life, with a focus on the treatment of distal radial fracture is one of the key strengths of our study. The employment of valid measures such as the Michigan Hand Outcomes Questionnaire (MHQ) and the SF-36 ensure the credibility of the results. Moreover, the surgical and non-surgical treatment groups allow for an analysis of recovery patterns from a wider perspective. The study is further strengthened by the multiple regression analysis which explicates the independent predictors of the outcomes such as age, hand dominance, and education level, which is very useful clinically. A significant weakness, however, is that there is no assessment of long-term follow up as the outcomes were evaluated with a short-term frame that do not tick off those aspects that are in the periphery for understanding sustained recovery and late complications. Also, not having a cohort analysis does not allow for measuring changes in the target group over time. Further work needs to be directed towards the collection of long-term outcome measurement, and cohort-based studies to appreciate in more detail the functional recovery and quality of life of distal radial fracture patients over time. This would lead to a better-informed clinical practice and better treatment of distal radial fractures.

CONCLUSION

This study highlights the importance of patient-reported outcomes in assessing recovery after distal radial fractures (DRFs). Both operative and non-operative treatments demonstrated satisfactory functional and aesthetic outcomes. However, patients who underwent surgical intervention showed significantly better functional recovery, particularly in hand function, activities of daily living, and work performance. Aesthetic outcomes were highly rated across both groups, indicating that patients were generally satisfied with the appearance of their wrist post-treatment. Additionally, overall health-related quality of life, as measured by SF-36, reflected a positive perception of recovery. Factors such as age, hand dominance, and education level significantly influenced patient-reported outcomes. The findings emphasize the need for incorporating PROs in clinical practice to ensure patient-centered care. Future studies should focus on long-term cohort analysis to further understand the sustainability of these

outcomes and explore additional factors affecting functional and aesthetic recovery in DRF patients.

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