ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE, DEPARTMENT OF ORTHOPEDICS & TRAUMATOLOGY

PATIENT REPORTED LONG TERM OUTCOMES OF NON-OPERATIVELY TREATED DISTAL RADIAL FRACTURES AMONG ADULT PATIENTS ATTENDED BLACK LION SPECIALIZED HOSPITAL

ADDIS ABABA, ETHIOPIA.

By:

LOPISO HAILEMARIAM (MD)

A Thesis submitted to the Department of Orthopedics and Traumatology, AAU, CHS and SOM in Partial fulfillment for the requirement of the specialty certificate in Orthopedics and Traumatology.

OCTOBER, 2024

ADDIS ABABA UNIVERSITY

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OCTOBER, 2024

ADVISOR'S APPROVAL SHEET

This is to certify that the thesis entitled **"Patient reported functional outcomes of non-operatively treated distal radial fractures among adult patients attending Tikur Anbessa Hospital, Addis Ababa, Ethiopia''** is submitted in partial fulfillment of the requirements for the Specialization Certificate in Orthopedic and Trauma surgery to the department of Orthopedic Surgery, Addis Ababa University college of health science and has been carried out by Dr Lopiso Hailemariam under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby can submit the Thesis to the Department.

GELETAW T (MD)	_____	_____
Name of Major Advisor	**Signature**	**Date**

ABSTRACT

Background: Distal radial fractures are among the most common fractures seen in adults. They account for approximately 18% of all fractures. They have a bimodal distribution pattern with high-energy fractures most commonly occurring in young men and low-energy fractures occurring in elderly women. It occurs two to three times in female as in male. Low energy fracture is commonly seen in osteoporotic bone. Its management can be non-operative or surgical depending on various factors. Despite the condition being very commonly encountered in clinical practice, there is lack of general agreement in its treatment options. Following any of the management method, patient outcome can be assessed using physician based or patient reported outcome measures.

Objective: The main objective of this study was to assess the functional outcome of non-operatively managed distal radial fractures and identify factors that influence the outcome.

Methods and Materials: A retrospective cohort was done on non-operatively managed distal radial fracture patients. QDASH questionnaire was used to interview patients and score were used to assess patients' functional status. In addition, socio-demographic factors and radiograph were studied to evaluate their influence on outcome.

Work plan and budget: QDASH questionnaire and additional variables given by the investigator were prepared in printed form. Trained data collectors called patients via phone number that is registered on EMR system or morning report form and responses were recorded in written form. Financial support to be made by the AAU financing system.

Key words: Distal radial fracture, QDASH score, Non-operative management, Functional outcome,

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Abbreviations

- AAOS : American Academy of Orthopedic Surgeons
- AO : Arbeitsgemeinschaft für Osteosynthesefragen
- BMD : Bone Mineral Density
- DRF : Distal Radial Fracture
- MVC : Motor Vehicle Collision
- OTA : Orthopedic Trauma Association
- POP : Plaster Of Paris
- PROM : Patient-Reported Outcome Measures
- PBOM : Physician-Based Outcome Measures
- QDASH : Quick Disabilities of the Arm, Shoulder and Hand
- TASH : Tikur Anbessa Specialized Hospital

1. Background

Distal radial fractures are among the most common fractures seen in adults. They account for approximately 18% of all fractures and the incidence in females is higher than males by a factor of two to three. These fractures have a bimodal distribution with high-energy fractures most commonly occurring in young men and low-energy fractures occurring in elderly women (1). Several studies have documented the increased risk of a distal radius fracture in patients with decreased bone mineral density (BMD). In addition, a history of a prior forearm fracture is associated with a nearly 3-fold increased risk of a future fracture of the hip, spine, wrist, proximal humerus, and pelvis, compared with what is expected in the general population. Patients with low-energy distal radius fractures have a lower BMD than age-matched controls, and as the BMD decreases, the severity of distal radius fracture increases (13).

Patients usually present with history of fall onto an outstretched hand from standing height, with some being higher energy injuries. Presence of pain, swelling, and often visible deformity around the wrist is common. Plain radiography is used in diagnosis and guiding management decision. Among the several radiographic measurements commonly used for evaluation of distal radius fracture, average radial height (11 to 12 mm), average radial inclination (22 to 23 degrees), average volar tilt (11 to 12 degrees) and ulnar variance are usually employed. Computed tomography (CT) scan may be useful for preoperative planning to assess intraarticular extension, communition, and depression (1).

In the literature many classifications for DRFs exists. They have been developed to predict prognosis, guide a treatment plan, and improve scientific communication between treating surgeons. Mostly used classifications systems include the Frykman, Melone, Jupiter and Fernandez, and the AO classifications. None of them have been shown to be superior in clinical use due to poor interobserver and intraobserver reliability. From the scientific and research point of view, the AO classification has been accepted and used in the latest literature.

Despite the large volume of research, treatment choice of distal radial fractures remains controversial. The Clinical Practice Guideline (CPG) on the Treatment of Distal Radius Fractures from the American Academy of Orthopaedic Surgeons (AAOS) and Cochrane based Review concludes "there remains insufficient evidence from randomized controlled trials to determine which methods of treatment are the most appropriate for the more common types of distal radius fractures in adults" and further reviews are ongoing. Management options for distal radial fractures can range from non-operative management with cast or splints to operative treatment with percutaneous pinning, external fixation or ORIF (1, 4, 8).

While surgical treatment often targets restoration of anatomical alignment and function, non-operative management is a very common practice, particularly for non-displaced fracture types and low demand patient populations (15).

In consideration of low level expectations of elderly individuals, risks associated with anesthesia and treatment costs, non-surgical therapies are still a valid option. Partial recovery of wrist functionalities in mid-long term is possible for closed reduction and immobilization by casting (4).

2 Problem Statement

Several studies have found that the incidence of distal radius fractures worldwide has been increasing and their incidence continues to rise in part due to increased activity levels among the elderly, increased life expectancy, rising rates of obesity, changes to dietary habits, and the prevalence of osteoporosis (2). Despite the commonness of distal radial fractures and the practice of non-operative management, there is inconsistency in outcome measures and reporting, a complete understanding of the factors influencing these outcomes remains limited. Physician-Based Outcome Measures or Patient-Reported Outcome Measures (PBOM) can be used to assess the outcome in patients. However, Patient Reported Outcome Measures (PROM) like DASH score, Quick DASH scores and PRWE has largely replaced PBOM (1, 2, 6, 9).

Despite distal radial fractures being very commonly encountered and managed case, to the best of my knowledge there are no publications in Tikur Anbessa Specialized Hospital as well as nationwide assessing the non-operative management outcomes.

Most of the patients were managed by closed reduction and cast immobilization. But, the functional status of them remains unclear. The aforementioned reasons are why I got interested in doing this research with the aim to assess the patient reported outcomes of non-operatively managed adult distal radial fractures, and factors influencing the outcome.

3. Objectives

3.1 Primary Objective

To evaluate the patient reported functional outcomes of adult distal radial fractures managed non-operatively.

3.2 Secondary Objectives

1. To analyze the factors that influences the prognosis and recovery in patients undergoing non-operative treatment.
2. To assess and compare the patient reported functional outcome in geriatric and non-geriatric patients managed non-operatively

4. Literature Review

Fractures of the distal aspect of the radius are very common and they constitute a substantial proportion of the workload in orthopedic trauma practice. Stable fractures can be managed conservatively with closed reduction and cast immobilization, with good anatomical and functional results (5). However, the management of the unstable fracture of the distal part of the radius continues to stimulate debate, particularly when such a fracture occurs in an elderly patient (6, 7, 9). The cost of treating DRF will become a larger burden to health care systems worldwide as the population ages (12).

Chung et al. did a systemic review as part of the Wrist and Radius Injury Surgical Trial (WRIST). They assessed patient satisfaction after treatment of distal radial fractures in older adults. They concluded older patients were satisfied upon recovering 59% of grip strength and 79% of wrist arc of motion as compared with the uninjured hand at 3 months after treatment (12).

A Systematic review done by Diaz-Garcia et al. on outcomes and complications of treating unstable distal radius fractures in the elderly demonstrated a better grip strength and wrist motion in patients treated with open reduction and internal fixation compared to those with closed reduction and cast immobilization. However, the activities of daily living didn't rely on radiographic excellence. Thus, the method of treatment in these patients should be chosen based on risk-benefit ratio assessment (3).

In a randomized controlled trial, Daniel Martinez-Mendez et al. compared the patient as well as physician reported outcome of elderly (>60years) patients with intraarticular distal radial fracture managed with open reduction and internal fixation or closed reduction followed by casting. They reported a significantly better functional outcome and quality of life in those underwent open reduction and internal fixation compared to conservatively treated group. In addition they observed secondary loss of reduction in twenty five percent of conservatively treated patients (14).

Alexander Anzarut et al. did a prospective study on elderly patients fifty years and above with isolated distal radial fractures managed conservatively. They assessed radiologic and patient reported functional outcome at follow up. Their conclusion was isolated distal radial fractures in elderly managed with closed reduction and casting yields satisfactory functional outcome. They also reported there is no significant relation between functional outcome and radiographic acceptable reduction parameters (10).

In a retrospective study done by Roderick et al. on patient reported functional outcome of distal radial fracture patients managed non-operatively. They evaluated function of elderly patients with distal radial fractures 3-4 years after non-surgical management. Their results showed elderly patients have a good overall long-term outcome with less pain and good wrist function (13).

The American Academy of Orthopedic Surgeons (AAOS) and the American Society for Shoulder of the Hand (ASSH) did a systemic review and developed a clinical practice guideline for management of acute adult distal radial fractures.

They found strong evidence from high quality studies, that operative management compared to non-operative management of geriatric distal radial fractures doesn't lead to a better long term patient reported outcome. Multiple trials and studies have also demonstrated nonsurgical treatment of distal radius fractures to be equivocal to surgical treatment (2).

A retrospective cohort study on non-operatively managed isolated distal radial fractures was carried out by Mulders et al. Their result showed elderly patients managed by closed reduction and casting and in whom acceptable radiologic alignment achieved have a good functional outcome after 12months. However, secondary displacement and symptomatic malunion led to secondary surgery in about 40% of patients. They also noted the need for secondary surgery is more common in younger patients. In their conclusion, they found no significant difference in functional outcome between the conservatively managed patients and those who underwent surgical intervention (4).

In a follow up study done by Kilic et al. on anatomic and functional outcome of non-operatively treated unstable distal radial fractures (AO/OTA C) in elderly, they reported a successful treatment with closed reduction and casting. About 90% of patients treated non-operatively had satisfactory functional outcome. They also noted the patient functional outcome and satisfaction can be negatively affected by osteoporosis and reduced grip strength, implying the need for bone mineral density measurement and grip strength assessment (6).

Azzopardi et al. performed a prospective randomized study on elderly patients (>60 years) with unstable exraarticular distal radial fractures. They compared outcome following cast immobilization alone with those managed with cast immobilization augmented with percutaneous K wire pinning. They concluded, although K wire augmentation of cast immobilization showed marginal improvement in radiological alignment, the functional outcome has no significant difference (7).

Systemic review done by Rohit et al. on Current aspect of management of distal radius fractures in the elderly individuals. Different studies on management outcome of distal radial fractures reported various results.

This review showed, although elderly patients managed with open reduction and internal fixation have some improvement in grip strength, the overall functional outcome showed no significant difference compared to those treated with closed reduction and cast immobilization (8).

A review of existing literature reveals mixed results regarding the efficacy of non-operative management of distal radial fractures. Some studies suggest that non-operative treatment can yield satisfactory outcomes, particularly in low-demand patients or those with minimally displaced fractures. However, other studies indicate higher rates of malunion, decreased wrist function, and prolonged pain in patients managed non-operatively compared to those undergoing surgical treatment. (6-8).This proposal aims to address these discrepancies by providing a more comprehensive analysis of non-operative management and functional outcomes.

5. Methodology

5.1 Study Design

A Retrospective cohort study will be conducted involving adult patients with distal radial fractures managed non-operatively.

5.2 Study area

Tikur Anbessa Specialized Hospital (TASH) is the teaching hospital of the College of Health Science in AAU based in Addis Ababa, Ethiopia. TASH is the largest specialized hospital in Ethiopia, with over 700 beds, and serves as a training center for undergraduate and postgraduate medical students.

The Department of Orthopedic Surgery is one of the main departments in Tikur Anbessa Specialized Hospital. It was founded and established on September 25, 1987 as the premier Orthopaedic center in the country. The department gives a full-fledged Musculoskeletal clinical service, offers specialty and sub-specialty training, and conducts research. The Department of Orthopedic Surgery is staffed with Professor, Subspecialty surgeons in Orthopedic Trauma and Arthroplasty, Sports and Arthroscopy, Musculoskeletal Oncology and Reconstruction, Spine and Pediatric Orthopedic Surgery, Fellows and Residents in training. The Department receives

referred fracture/trauma patients, emergency and all regular musculoskeletal conditions from all over the nation.

Adult patients who present with closed acute distal radial fractures that are indicated for non-operative management are usually managed at emergency department by assigned Orthopedic and Trauma Surgery team. Most of the time acute fracture manipulation is done after hematoma block with Lidocaine, but occasionally procedural sedation and narcotics are used for this purpose. After closed reduction and casting control x-ray will be taken and if acceptable parameters achieved patients will be sent home with NSAIDs, Vitamin D and Calcium supplement. Those who received procedural sedation will be kept for observation.

5.3 Study period: January 2020 to December 2023

5.4 Study design: Retrospective cohort study

5.5 Source population

All closed distal radial fracture patients visited TASH in study period

5.6 Study populations

All closed distal radial fracture patients managed non-operatively in the study period

4.6. Inclusion Criteria: All adults with closed distal radial fractures managed non-operatively.

Exclusion Criteria: Patients with open fractures, with associated ipsilateral upper extremity fractures, those with less than 1year follow-up or underwent surgical intervention will be excluded. Patients with incomplete hospital data and incomplete responses will also be excluded.

4.7 Sample Size

All patients who fulfilled inclusion criteria will be studied.

4.8 Sampling technique

All closed distal radial fracture patients managed non-operatively

4.9 Data Collection

Data will be collected from OPD and ED log book, from morning report form, from patient charts and EMR, and on X-ray of patients in the computer system.

Patients will be interviewed via phone call

5. Data Analysis

Data will be entered manually to excel sheet and then imported to computerized statistical program SPSS version 27. Using SPSS software Statistical analysis will be performed. Frequencies and percentages will be calculated for descriptive analysis of socio-demographic variables. Comparative analysis between subgroups will be conducted using t-tests for continuous variables and chi-square tests for categorical variables.

Odd ratio will be used for comparative association between each risk factors and functional outcome. Multivariate regression analysis will be employed to identify independent predictors of functional outcomes and complications.

5.1 Data Quality Control

Continuous evaluation and tallying of the collected data will be carried out by researcher and supervised by principal investigators

5.2 Dissemination plan

The final result from the study will be submitted to Department of Orthopedics and Traumatology at TASH, Addis Ababa University in the form of written document and will be presented for the concerned body.

Results

From January 2020 to December 2023, a total of 192 patients are found to have distal radial fractures. After excluding 84 patients based on exclusion criteria, 109 patients fulfilling inclusion criteria were identified. For the assessment of functional outcome, we used the QDASH (Quick Disability of Arm, Shoulder and Hand) questionnaire tool.

Out of the 108 patients, female accounted for 60.6% (N-66) and male were 39.4% (N-43) with M: F ratio 1:54. The median age of the patients in our study was 50 with youngest age of 19 and oldest age 95 years. For epidemiological study purpose, the patients were categorized into three age groups: A) 18-29; B) 30-59; C) 60 and above. For both male and female the peak incidence of distal radial fracture occurred in age group 30-59 years (M-55.8%; F-57.6%). However, at younger age group the incidence was high in males compared to females (M: F = 13.9:1).

Housewives were most commonly affected (34.9%) followed by sanitation workers (12.8%), business workers (10.1%), construction and office workers (6.4% each). About 89.9% the fractures resulted from falling down injuries followed by motor vehicle collision (8.2%) and fighting/assault injuries (1.8%). Low energy falling down injury from ground level accounted for 67.9%, whereas falling down from height contributes for 22% of fracture. The fracture occurred on right side in 51% of cases and left side 49% cases. Fifty seven percent of patients were right handed whereas 43% were left handed.

Based on AO/OTA classification, most common type of fracture were extra articular (68%) followed by partial articular (26%) and complete articular (6%). Associated distal ulnar fracture was seen in 71% of cases. Closed reduction of the fracture was done for 79% of the patients (N=86), whereas the remaining 21% (N=23) managed with POP application without any manipulation. Regarding method of immobilization, 98% of the cases were initially splinted with radial gutter splint and two percent had circular cast. Ten percent of the radial gutter splinted cases had latter converted to circular cast. The POP immobilization was kept for an average 4-6 weeks in 59.6% (N=64) patients and 7-8 weeks in 40.4% (N=44) of patients. On discharge from hospital, patients were provided with combination of NSAIDs, Vitamin D and Calcium (45%; N=49); NSAIDs (41%; N=45); NSAIDs, Vitamin d, Calcium and Vitamin C (14%; N=15).

Following removal of the POP, about 83.5% of patients had physiotherapy, out of which 62.4% had unsupervised physiotherapy whereas only 21% had supervised physiotherapy. Sixty percent of the patients did physiotherapy for an average 1-2 weeks, out of these about 92.3% had unsupervised physiotherapy. From the 23.5% patients who had physiotherapy for an average 3-4 weeks, 69.2% undergone supervised physiotherapy. Cross tabulation and Chi square of independence done to evaluate relation between duration of physiotherapy and place of physiotherapy showed patients doing physiotherapy in supervised setting tend to do for longer duration (X^2=129.8; p< 0.001). About 16.5% of patients did no form of rehabilitation.

Table 1: Patient variables and frequency

Characteristics		**N=109 (%)**
Age	18-34	10 (9)
	35-59	62 (57)
	>=60	37 (34)
Sex	Female	66 (61)
	Male	43 (39)
Dominant hand	Right	62 (57)
	Left	47 (43)
Injured limb	Right	56 (51)
	Left	53 (49)
Concomitant distal ulnar fracture	Present	77 (71)
	Absent	32 (29)
AO type	A	74 (67.9)
	B	28 (25.7)
	C	7 (6.4%)
Mechanism of injury	Falling from ground level	74 (68)
	Falling from height	24 (22)
	MVC pedestrian	8 (7.3)
	MVC passenger	1 (0.9)
	Fight/assault	2 (1.8)

We used the Shapiro-Wilk test to assess our data distribution normality. The result showed a non-normal data distribution with test statistic value (W=0.86) and p value <0.001. Thus, non- parametric tests were used to evaluate group comparisons and correlation analysis.

DASH tool is a questionnaire used to assess patient reported functional status of Arm, Shoulder and Hand. The original tool has 30 item questionnaire which subsequently undergone some shortening in its number of questions. QDASH-9 is one of such short form with similar accuracy in score prediction to original 30-item DASH tool.

The median QDASH score for patients 60 years and older was 19.25 (Mean QDASH= 20.3; IQR=6), 41.25 for 30-59 years group (Mean QDASH= 37.8; IQR=9) and 46.75 for 18-29 years group (Mean QDASH=45.4; IQR=3). For the extra articular fracture the median QDASH was 33 (IQR-22), for partial articular 38.5 (IQR-22), and for complete articular 46.7 (IQR-6).

A Mann –Whitney U test performed to compare QDASH score among male and female groups showed a better functional outcome in female patients (Mean Rank =46.63 in female; Mean Rank=67.85 in male; p value 0.001). Prolonged immobilization beyond 6weeks appears to worsen the functional outcome (Mean Rank=63.64 for >6weeks; Mean Rank=49 for <6weeks; P=0.18). Patients who did have physiotherapy (Mean Rank=43.6) had a statistically significant (p<0.001) improved function compared to those who had no physiotherapy (Mean rank=87). QDASH score was statistically insignificant in relation to side of injury, handedness and presence or absence of distal ulnar fracture.

We used Kruskal-Wallis test to compare differences in QDASH score and its statistical significance among different age groups. The result showed a significant difference in QDASH scores among the age groups (H=56.47; df=2; p <0.001). Strong negative correlation seen between QDASH and age group (ρ= -0.722; p <0.001). Elderly patients have better functional outcome compared to younger patients. There is also significant difference in QDASH score in relation to AO/OTA category (H=11.09; df=2; p <0.004). In a subgroup analysis significant but weakly positive correlation was seen between AO/OTA category and QDASH score suggesting a better functional outcome in extraarticular and partial articular types compared to complete articular (ρ=0.24; df=2; p=0.013).

A statistically significant difference was seen in QDASH score among those who had physiotherapy and those who didn't do physiotherapy (Mean rank: 48.65 Vs 87.11; p <0.001). Patients who had a supervised physiotherapy have a better functional outcome compared to those with unsupervised physiotherapy (H= -24; p=0.001). Physiotherapy duration of 3-4 weeks was associated with better functional outcome compared to 1-2 weeks duration (H=18.34; p=0.012)

Table 2 : QDASH score and significance

Factors	Groups	Number	Mean Rank	Median QDASH (IQR)	P value
Sex	Male	66	67.8	41(25)	<0.001
	Female	43	46.6	28.9 (20)	
Age group	18-29	10	-	46.7 (3)	<0.001
	30-59	62	-	41.25 (9)	
	60 and older	37	-	19.25 (6)	
AO/OTA type	A	74	-	33 (22)	0.004
	B	28	-	38.5 (22)	
	C	7	-	46.7 (6)	
Duration of immobilization					0.18
	4-6 weeks	65	49	33 (23)	
	7-8 weeks	44	63.6	39.9 (25)	
Physiotherapy done	Yes	91	48.6	30.25 (22)	<0.001
	No	18	87	46.7 (6)	
Physiotherapy place	Supervised	23	-	22 (11)	<0.001
	Unsupervised	68	-	38.5 (23)	
	Not done	18	-	46.7 (14)	
Physiotherapy duration	1-2 weeks	65	-	38.5 (21)	<0.001
	3-4 weeks	26	-	22 (11)	
	Not done	18	-	46.7 (14)	

Discussion

Despite distal radial fractures being one of the most common fractures, the management of this condition is quiet non uniform.

Mulders et al. assessed functional outcome result after conservative management of distal radial fracture (N=116) and reported a median age of 62 years with female predominance (79%) (4). In our study (N=109) the median age was 50 years old with female predominance (60.6%) which is quite similar to their study. WQ, Chao et al. reported quiet different result in which males outnumbered female with the ratio of 1.21:1(15).

Mulders et al.,in their result showed elderly patients managed by closed reduction and casting and in who acceptable radiologic alignment achieved have a good functional outcome after 12months (4). Our study result showed elderly patients achieved a satisfactory functional outcome after non operative management of distal radial fracture. In contrary, increasing age correlated with decreased functional outcome of distal radial fracture (15).

Extraarticular (AO/OTA- A) fractures were the most common type accounting for 67.2% followed by complete articular fracture (AO/OTA-C=22.5%) and partial articular (AO/OTA – B=10.3%) (N=326) type (18). Our finding similarly showed type A fracture as the most common type (68%; N=109), but type B as the next common in frequency accounting for 25% and type C fracture seen in 6% cases. They reported a better functional outcome in AO type B fracture compared to type A and C fractures (18). In contrary, our study showed no significant difference between type A and type B fractures (adjusted p value=1.00), but both types (A&B) showed better functional outcome compared to AO type C fractures. WQ, Chao, et al. reported similar finding that type C fracture resulted in worse outcome compared to type A and B (18).

In their study of functional outcome, they reported there was no association between mechanism of injury and QDASH score (15). In our study, we also found no significant association between different injury mechanism and QDASH score.

Studies show strong correlation between prolonged immobilization and wrist joint stiffness. Such joint stiffness had resulted in restricted range of motion and poor functional outcome. There is no universal guide regarding duration of immobilization of the non-operatively treated DRF. (6, 8, 19).

Patients whose limbs were immobilized for shorter duration were found to have grip strength and patient-reported outcome (17). In a prospective study, Dias et al. reported that early mobilization resulted in rapid recovery of movement and strength. In our study we found a similar result that prolonged immobilization duration is associated with increased QDASH score, thus poor functional outcome.

We performed multiple linear regression analysis to identify predictor factors associated with significant QDASH score, thus functional outcome. Age and place of physiotherapy showed the strongest prediction with QDASH score (F-value: 130.462; p-value: < 0.001).

Table 3: Regression analysis result

Regression coefficients											
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations	Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Tolerance	VIF
1	(Constant)	65.001	2.944		22.076	0.000	59.164	70.838			
	Age group	-14.443	1.265	-0.741	-11.422	0.000	-16.950	-11.937	-0.741	1.000	1.000
2	(Constant)	67.069	2.613		25.671	0.000	61.889	72.248			
	Age group	-10.192	1.338	-0.523	-7.619	0.000	-12.844	-7.540	-0.741	0.690	1.449
	Medication on discharge	-6.739	1.181	-0.392	-5.708	0.000	-9.080	-4.398	-0.683	0.690	1.449
3	(Constant)	59.069	4.281		13.797	0.000	50.580	67.558			
	Age group	-9.615	1.334	-0.493	-7.208	0.000	-12.259	-6.970	-0.741	0.666	1.501
	Medication on discharge	-6.028	1.196	-0.350	-5.038	0.000	-8.400	-3.656	-0.683	0.645	1.550
	Physiotherapy place	2.802	1.202	0.145	2.331	0.022	0.419	5.185	0.464	0.811	1.233
a. Dependent Variable: QDASH score											

Limitation

The study being retrospective cohort study with some missing patient data was one factor. We were also not able to assess the early post-reduction and final radiographic findings to look for any association with functional outcome.

Conclusion

Functional outcome after non operative management of distal radial fracture is better in elderly compared to younger patients. Supervised physiotherapy was associated with favorable outcome. AO type A and B fractures had good comparable functional outcome, but type C fracture had poor outcome. Patients who were immobilized for prolonged duration (>6weeks) tend to have unfavorable functional outcome compared to shorter duration of immobilization.

Conflict of interest

None

Questionnaire summary

1. Age-------- a) 18-29 B) 30-59 C) >=60
2. Sex -----a) Male b) Female
3. Occupation
4. Dominant hand----a) Right b) Left
5. Injured limb----a) Right b) Left
6. Duration of injury (in days)
7. Mechanism of injury
   a) MVC
      i) Passenger ii) Pedestrian
   b) FDI
      i) Ground level
      ii) From height
   c) Other
8. Concomitant distal ulnar fracture----a) Present b) Absent
9. Fracture type(AO/OTA type)
   i) Extraarticular
   ii) Partial articular
   iii) Complete articular
10. Fracture manipulation and reduction-----i) Yes ii) No
11. Type of cast-----a) Gutter splint b) Circular cast c) initial gutter splint changed to circular cast
12. Duration of immobilization a) 4-6 weeks b) >7-8 weeks
13. Physiotherapy performed a) Yes b) No
14. Physiotherapy Place
    a) Supervised b) Non supervised c) Not done
15. Duration of physiotherapy a) 1-2 weeks b) 3-4 weeks
16. Medications provided on discharge
    i. NSAIDs Only

ii. NSAIDs, Calcium supplement & Vit D supplement

iii. NSAIDs, Calcium, Vit D and Vit C supplement

QUICK DASH 9 OUTCOME MEASURE QUESTIONNAIRE

	No difficulty	Mild difficulty	Moderate difficulty	Severe difficulty	Unable
1. Open a tight or new jar	0	1	2	3	4
2. Do heavy household chores (e.g. wash walls, floors, etc.)	0	1	2	3	4
3. Carry a shopping bag or briefcase	0	1	2	3	4
4. Wash your back	0	1	2	3	4
5. Use a knife to cut food	0	1	2	3	4
6. Recreational activities which require little effort (e.g., card playing, knitting etc.)	0	1	2	3	4

	Not at all	Slightly	Moderately	Quite a bit	Extremely
7. During the past week, to what extent has your arm, shoulder or hand problem interfered with your normal social activities with family, friends, neighbors or groups?	0	1	2	3	4
	Not Limited At All	Slightly Limited	Moderately Limited	Very Limited	Unable
8. During the past week were you limited in your work or other regular daily activities as a result of your arm, shoulder or hand problems	0	1	2	3	4
Please rate the severity of the following symptoms in the last one week	None	Mild	Moderate	Severe	Extreme
9. Arm, shoulder or hand pain	0	1	2	3	4

QDASH-9 score may not be calculated if there is greater than 1 missing responses

QDASH-9 Scoring guideline:

Number of Completed Responses ('n'): _____ Sum of 'n' Responses _____

QDASH-9 Score= [(Sum of 'n' responses) x 1.1] x5/2, where 'n' is number of completed responses

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