Functional Outcome in Upper Extremity Disorders using Disabilities of Arm Shoulder and Hand Questionnaire and Michigan Hand Questionnaire

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Abstract: *The Disability of Arm, Shoulder and Hand (DASH) questionnaire and Michigan Hand questionnaire (MHQ) is a standardized measure to evaluate activity profile of patients with upper extremity disorders. Based on the demographic data, clinical profile and scores of the DASH and MHQ, this study of 124 patients with upper extremity disorders evaluated functional limitations perceived from September 2014 to January 2015. Secondly, we explored the relationships among neck region, shoulder region, elbow region, wrist and hand region at the individual DASH item level and MHQ subset level. Exploratory testing of statistical significance showed that the DASH modules and MHQ subsets differentiated well among the regions (ANOVA* **P - value <0.05)** *and further differences existed at the item level and subset level respectively, so that the functional activity profile could be developed in patients with upper extremity disorders. Our findings confirm that there is a varying severity of functional activity profile in patients with upper extremity disorders.*

Keywords: DASH, functional activities, MHQ, upper extremity

1. Introduction

Musculoskeletal disorders are one of the leading non communicable diseases affecting people across globe. Upper extremity disorders are one of the most commonly recorded disorders in our field. These include different conditions of cervical spine which affect entire upper limb causing disturbances in the normal function of the upper extremity as a whole, also conditions affecting specific joints like PA shoulder, Tennis elbow, Rheumatoid arthritis, also included are traumatic injuries like fractures, tendon injuries, muscles tears, joint dislocations etc. Overuse injuries are commonly reported of specially in industrial settings leading to stress on particular structures causing inefficiencies at work places. These inefficiencies arise mainly due pain secondly due to biomechanical insufficiency, age and various other co morbid factors, including psychological factors.

The stages of tissue healing are divided into Acute (0 - 10 days), Sub - acute (10 days - 7weeks), Chronic (>7weeks) [1]

There are numerous instruments and parameters which are used to measure anatomical and biomechanical dysfunction objectively. For example goniometers, resisted isometric testing, electrical instruments to measure pain thresholds etc., EMG - NCV to measure conduction velocities and muscle activation. However, there is no set measure or parameter for functional activities, they still remain highly subjective.

In clinical settings more than biomechanical inefficiencies, it is the quality of life and functional limitations that the patients complain of. In order to quantify these limitations outcome measures have been formulated. Questionnaires are of different kinds, general, extremity specific or condition specific Functional outcome measures although relatively subjective give us a fair estimation of the level of functional disabilities and are used as an important tool for prognosis. Various scales have been formulated which are condition specific and ask questions specific to the area and the possible impairments due to that condition. The score thus derived is individual specific and is used for treatment follow up. International classification of function (ICF) has emphasized on activity limitation and participation restriction hence our rehabilitation focuses not only in reduction of symptoms but to enhance patient's participation in his daily life activities. In this study DASH and MHQ outcome measures have been used to analyze the amount of functional disabilities in different upper extremity disorders. DASH and MHQ have been chosen for this study as they are generic in terms with upper extremity disorders and are valid and reliable. [2, 3, 4]DASH is a general self - administered questionnaire relating to conditions affecting the entire upper extremity. The scale is used for unilateral affection of the limb. It consists of six domains relating to different activities. A set of thirty questions have to be answered on a scale of 0 – 5, measuring the amount of difficulty the patient has experienced in the past week due to his condition. [5]

MHQ is a wrist and hand specific questionnaire for impairments relating just to the wrist and hand. For example distal end radius fracture, tendon injuries etc. It evaluates the individuals for impairments bilaterally and also has a section of questions related to the appearance and aesthetics of the wrist and hand.

To enhance clinical decision making in treatment we use standardized outcome measure in upper extremity rehabilitation. Disability of Arm Shoulder and Hand (DASH) and Michigan Hand Outcomes Questionnaire (MHQ) are region specific, patient reported functional outcome measures in upper limb musculoskeletal disorders.

2. Methodology

After obtaining departmental ethics committee permission all patients referred to Physiotherapy outpatient department with upper extremity musculoskeletal disorders from September 2014 to January 2015 were recruited into the study. All these patients were treated by orthopedic department of our University Hospital. This cross sectional study was performed during their first visit to Physiotherapy department and reflects patient's health status at that time. Patients of both gender and age over 18 years were included in the study. Aim of study and questionnaire was duly explained to patient and consent was obtained. Demographical data and clinical profile was recorded and questionnaires (DASH and MHQ) were answered on an interview basis. Data was collected once only by five different testers. Incomplete DASH (three or more items missing) and MHQ (of patients with no wrist and hand impairment) were excluded from the analysis [6]. Data analysis (ANOVA and Mean ±SD) was done using SPSS 16 software.

3. Results

A total sample of 124 patients, 73 men and 51 women, with an age range of 20yrs - 78yrs completed the DASH and MHQ questionnaire. The distribution of the diagnostic groups with respect to region within the total sample is shown in Table 1. Our data were not stratified due to relatively few numbers of women within individual groups. Demographic and clinical profile of patients is shown in Table 2. Dominance profile in table 4.

DASH score – table 5The average score of DASH Questionnaire for neck was 36.43 ±16.89 (range 11 - 78), for shoulder was 37.32 ±14.91 (range 7 - 83), for elbow was 30.40 ±8.59 (range 15 - 48) for wrist & hand was 41.48 ±16.28 (range 11 - 78). (MHQ score – table 6)

MHQ was scored domain wise in which median for Q1 was 72.5, Q.2a was 85, Q.2b was 78.5, Q.2adl was 80.5, Q.3 was 57.5, Q.4 was 35, Q.5 was 25, Q.6 was 75. (refer table 8)

In the DASH questionnaire analysis wrist and hand region were mild to moderately affected than the other three regions namely elbow, shoulder and neck in fine motor activities and tasks which involved grasping and pinching and shoulder region was moderately affected in overhead activities and activities involving external rotation of shoulder as compared to other regions. (table7)

In Michigan Hand Questionnaire, the overall hand functions, activities of daily living and bimanual activities and satisfaction domains were most affected in patients with wrist and hand disorders as compared to the other three regions. (table8).

4. Tables

Table 1: Clinical profile of patients

Diagnosis	Total subjects (n=124)	Males (n= 73)	Females (n= 51)
Neck region	20	5	15
Cervical Spondylosis	6	4	2
Cervical Spondylosis with Radiculopathy	14	1	13
Shoulder region	52	32	20
Adhesive Capsulitis	32	18	14
Rotator Cuff Injuries	16	10	6
SLAP Lesion	2	2	0
Clavicle fracture	1	1	0
Deltoid Strain	1	1	0
Elbow region	14	10	4
Tennis Elbow	10	6	4
Elbow Dislocation	3	3	0
Head of radius fracture	1	1	0
Wrist and Hand region	38	26	12
Distal End Radius Fracture	19	11	8
Shaft of Radius and Ulna Fracture	3	3	0
Scaphoid # with Wrist Dislocation	1	1	0
Flexor Tendon Repair	4	3	1
Extensor Tendon Repair	3	2	1
Tenosynovitis	1	0	1
De - Quervains Syndrome	1	0	1
Bilateral Wrist and Hand Burns	1	1	0
Metacarpal Fracture	5	5	0

Table 2: Demographic and clinical profile

Groups	No of Patients (n)	Age (Yrs) (Range)	Sex M: F	Stage of Healing			Mechanism of injury		
				Acute (0 - 10 days)	Sub - acute (10 days 7weeks)	Chronic (>7weeks)	Overuse	Traumatic	Degenerative
Group 1 Neck Region	20	25 - 70	01:03	1	4	15	8	0	12
Group 2 Shoulder Region	52	21 - 75	02:01	1	16	35	19	9	24
Group 3 Elbow Region	14	20 - 75	02:01	2	4	8	7	7	0
Group 4 Wrist & Hand Region	38	20 - 78	02:01	1	8	29	1	37	0

Total	124	20 - 78	03:02	5	32	87	35	53	36

Table 3: Mechanism of Injury Agewise

Mechanism of Injury	Total Cases	Age Groups (years)		
		18 - 30	31 - 60	61 and above
Overuse	36	6	28	2
Traumatic	52	13	29	10
Degenerative	36	0	24	12
Total	124	19	81	24

Table 4: Dominance Profile

n=118	Dominant	Non Dominant
Cases	95	23
Cervical spondylosis with radiculopathy	10	4
Shoulder region	42	10
Elbow region	10	4
Wrist and hand region	33	5

Table 5: DASH mean score

Region	n	DASH (Mean ±SD)
Total	124	37.67 ±15.31
Group 1 (Neck region)	20	36.43 ±16.89
Group 2 (Shoulder Region)	52	37.32 ±14.91
Group 3 (Elbow region)	14	30.4 ±8.59
Group 4 (Wrist & Hand Region)	38	41.48 ±16.28

Table 6: MHQ score Region wise

n=124	MHQ (Median)							
	Q.1 (overall hand function)	Q.2 (R - ADL)	Q2 (L - ADL)	Q.2 (B - ADL)	Q.3 (work)	Q.4 (pain)	Q.5 (aesthetics)	Q.6 (satisfaction)
Group 1 (Neck region)	60	90	75	81.2	45	37.5	25	68.7
Group 2 (Shoulder Region)	100	100	100	100	100	0	25	100
Group 3 (Elbow region)	75	85	73.2	77.5	47.5	42.5	43.7	75
Group 4 (Wrist & Hand Region)	55	65	66	63	40	50	43.7	50

Table 7: Item - wise analysis of DASH

DASH	Mean ±SD	P value	F	df
Item 1	2.45±1.16	P=0.000	7.829	3
Item 2	1.93±1.22	P=0.000	15.123	3
Item 3	1.18±1.07	P=0.000	11.676	3
Item 4	2.61±1.87	P=0.003	4.817	3
Item 5	2.91±1.08	P=0.027	3.166	3
Item 6	3.04±1.07	P=0.003	4.866	3
Item 14	2.95±1.24	P=0.007	4.277	3
Item 15	2.51±1.11	P=0.006	4.406	3
Item 16	2.04±1.11	P=0.000	12.659	3
Item 17	1.98±1.10	P=0.000	11.09	3
Item 24	2.33±0.95	P=0.000	6.529	3
Item 26	1.5±0.88	P=0.000	8.954	3
Item 27	2.15±1.04	P=0.017	3.538	3
Item 29	2.35±1.23	P=0.005	4.468	3

Table 8: Subset analysis MHQ

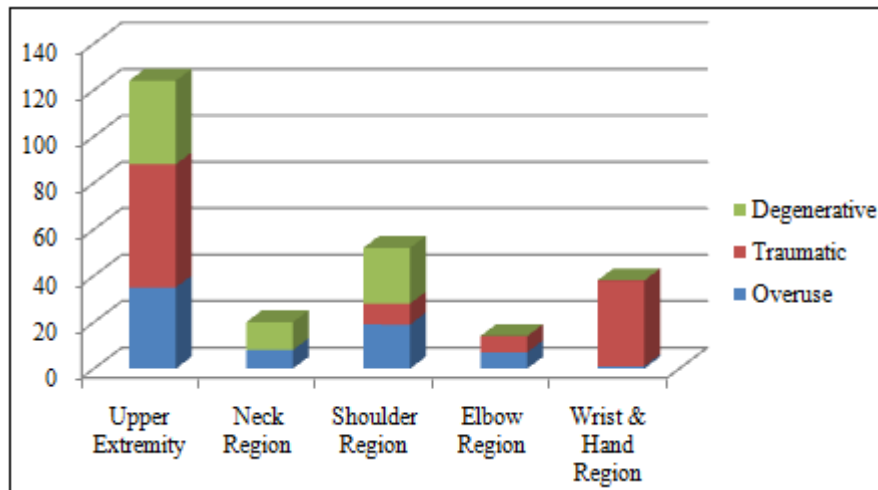| MHQ	Mean±SD	P value	F	df
Subset 1	12.62±3.49	P=0.000	9.03	2
Subset 2	27.65±11.07	P=0.000	9.703	2
Subset 6	15.19±5.07	p=0.001	7.759	2

Graph

Figure 1: Region wise classification of disorders

5. Discussion

In our study the functional outcome measures used were Disablities of Arm, Shoulder and Hand Questionnaire and Michigan Hand Questionnaire which rated pain, activity limitation and participation restriction objectively. The sample population was divided into four broad group neck (16%), shoulder (42%), elbow (11%) and wrist and hand (31%) according to upper extremity disorders. The study was conducted in MGM Hospital, Kamothe, musculoskeletal OPD and Mathadi Charitable Trust, Physiotherapy OPD from September 2014 to January 2015, during which cases commonly found were of cervical Spondylosis with radiculopathy in neck region as compared to cervical Spondylosis. In the shoulder region Periarthritis of shoulder, Rotator Cuff Injuries, SLAP lesion, fracture of humerus, clavicle, deltoid strain were the conditions that we came across, out of which Periarthritis of shoulder was the most prevalent (62%) and Deltoid Strain least prevalent. Disorders of the elbow least commonly occurred during the given time period (11%) out of which maximum cases were of tennis elbow (71%). In the wrist and hand region Radius and Ulna Fractures (58%) were the most commonly occurring cases and Tenosynovitis being the least common. Out of 124 subjects selected males (59%) were more affected as compared to females (41%) with Upper Extremity Disorders. In the neck region females were more affected than males. Maximum number of cases was above 40 years of age which showed overuse and age related degenerative changes. Two cases which were below 40 years of age were due to overuse and poor posture. In the shoulder region, males were more affected than females in the age of 21 - 75 years. Periarthritis shoulder was more common in the older age i. e.44 - 75 caused due to degenerative changes and overuse injury. RCT was common in the age of 33 - 66 caused due to overuse & traumatic injuries. In elbow region and wrist and hand region, males were more affected than females in the age group of 20 - 75 and 20 - 78 years respectively caused due to overuse & traumatic injuries. It was also found that maximum number of cases was chronic as patients were advised rest and medications as the first line of treatment. Incidence of overuse injury was maximum in age group of 31 - 60 years as this group mainly consists of working population where chances of cumulative trauma disorders and work related overuse injuries are maximum which leads to absenteeism in work place followed by degenerative conditions. In the age group of 61 years and above majority of cases were of degenerative conditions as due to ageing there is increased degeneration of bones (bone mass and density decreases), joints (synovial fluid content decreases and cartilage erosion occurs), intervertebral disc becomes thin due to decrease in fluid content. In all age groups males were more affected than females and dominant extremity was more affected than non - dominant extremity which may be because, generally when there is increased activity restriction that patients are referred for treatment, also in India, majority population is right hand dominant, therefore all the equipments are basically right hand based so people tend to use more of dominant upper extremity and was also found in a study done by Rehman Shiri [8]. In DASH Questionnaire activities like opening ttight jars, writing, preparing a meal, pushing open heavy doors, overhead activities, using a knife, fine motor activities like knitting, playing cards and symptoms of weakness in upper extremity were considered mild to moderately difficult in wrist and hand region as compared to neck, shoulder and elbow regions. These activities involve more of wrist and hand function, due to injury, normal length tension relationship is altered, normal joint play is affected and pain results in apprehension in performing activities. Placing an object overhead, taking hand behind to reach the back, wearing a pullover and having difficulty in sleeping were considered moderately difficult in shoulder region as compared to neck, elbow and wrist and hand regions. These activities primarily involve shoulder due to the different impairements there is restriction in movement, altered capsular pattern and scapula - humeral rhythm, this results in inability or difficulty in performing the above mentioned tasks [7, 9].

In MHQ, subset 1which involves overall hand function and subset 2 which includes daily activities and bimanual activities, wrist and hand region activities were more restricted as compared to neck region and elbow region. Whereas in subset 6 which rated patient perception regarding satisfaction in wrist and hand region were

considered more dissatisfied as compared to patients in elbow region.

6. Conclusion

Varying severity of functional activity profile was observed in patients with upper extremity disorders.

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