Responsiveness of Michigan Hand Outcomes Questionnaire and Disabilities of Arm Shoulder and Hand Questionnaire in Patients with Distal Radius Fracture Receiving Physiotherapy

Neha A Manakeshwar[1], Chhaya V Verma[2]

[1]Consultant Physiotherapist, Health Point Polyclinic, Pune, Maharashtra, India
[2]Professor & Head of Department of Physiotherapy at Topiwala National Medical College and B.Y.L Nair Hospital, Mumbai, Maharashtra, India

Corresponding Author: Neha A Manakeshwar

ABSTRACT

The purpose of this study was to determine and compare the responsiveness of Michigan hand outcomes questionnaire (MHQ) and Disabilities of Arm Shoulder and Hand questionnaire (DASH) in patients with distal radius fracture receiving physiotherapy. 50 patients prospectively completed the MHQ and DASH questionnaires on day one of physiotherapy, at the end of 4 weeks of physiotherapy, and at discharge ($\leq$ 6 months). Data was analyzed using repeated measure analysis of variance test (ANOVA). Responsiveness to clinical change was calculated using Standardized response mean (SRM). SRM values of MHQ were higher than DASH during all the three periods [(2.68; 2.07; 3.20)] > [(1.98; 1.50; 2.40)]. Our results indicate that both MHQ and DASH show large SRM values (> 0.8) hence both are highly responsive during a 6 month follow up after distal radius fracture treatment, clarifying the applicability of both outcome measures related to outcome studies of distal radius fracture. However, MHQ may be preferably used over DASH in outcome studies of distal radius fracture.

Key Words: Michigan hand outcomes questionnaire (MHQ), Disabilities of arm shoulder and hand questionnaire (DASH), distal radius fracture, responsiveness.

INTRODUCTION

Outcome measurement is receiving an increasing emphasis in today's health care environment. Written questionnaire reports provide clinicians with an easily administered, cost-effective method of measuring treatment outcomes. The trend in outcome studies has been to increase emphasis on function and disability from patient's perspective. Patient's satisfaction with their return to function after an injury is an important measure of quality of care delivered by physiotherapists. Since decisions regarding therapy are based on the outcomes of treatment, caregivers have the responsibility of defining and specifically measuring the effects of intervention and quality of care on an ongoing basis. [1] Fractures of distal end radius in adults have been estimated to account for 18% of all the fractures that are seen and treated in emergency room [2] The fracture generally results from low energy trauma to the wrist. Although, wrist is truly a mechanical marvel when it is intact and functioning, a broken wrist will inevitably cause dysfunction of hand and thus the entire upper extremity.

Responsiveness refers to the ability of instrument to accurately detect clinical change when it has occurred. [3] An in-depth research has already been performed regarding the comparative responsiveness of MHQ and DASH in patients following hand surgery, carpal tunnel syndrome. In this

study, an attempt is made to determine and compare the responsiveness of MHQ and DASH in patients with distal radius fracture (DRF) receiving physiotherapy treatment.

MATERIALS AND METHODS
Patient selection
Consecutive adults with a medically diagnosed DRF, after immobilization, who were referred to physiotherapy outpatient department, were randomly selected. These patients were receiving only physiotherapy and the standard medical care during the entire time frame of study.

Patients with significant secondary problems involving central nervous system, cardiovascular system were excluded. Also, those with associated fractures of any other part of upper limb and/or lower limb were excluded. Finally, those presenting any significant cognitive, hearing and visual impairment which may hamper understanding and reporting of questionnaires were excluded.

Materials
The MHQ is a hand-specific questionnaire for patients with chronic hand conditions. Consisting of 57 items, it distinguishes between the left and right hands over six domains including overall hand function, activities of daily living, pain, work performance, aesthetics, and patient satisfaction with function. The MHQ has been used in carpal tunnel syndrome, distal radius fracture, hand reconstruction, and arthroplasty in rheumatoid arthritis. Each domain is scored from 0 to 100, where a lower score denotes more severe disability except for the pain domain where the opposite holds true. The final score is obtained by averaging the six scores after reversing the pain score. If scores of more than two subscales are missing, an overall MHQ score cannot be computed. [4]

The DASH is a 30-item questionnaire used to measure disability for any disorder affecting the upper extremity by assessing severity of symptoms and difficulty in completing specific tasks. Its validity, reliability, and responsiveness have been reported for a variety of upper extremity conditions. [5-7] The score, which does not distinguish between the right and left extremities, is transformed to a scale of 0 to 100, where a higher score indicates more severe disability.

Administration
The study was conducted in physiotherapy outpatient department of a tertiary care hospital. Institutional ethics committee permission and approval was obtained prior to the initiation of the study. Written informed consent was obtained from all the study subjects. The questionnaires were answered on an interview basis. Each subject answered both questionnaires in succession, MHQ followed by DASH. All the above was taken on day one of physiotherapy treatment, at the end of 4 weeks of physiotherapy and at discharge from physiotherapy ($\leq$ 6 months) Patients were given individualized physiotherapy intervention based on their clinical examination findings. It included, standard advice on fracture protection, pain reduction and oedema control, skin care and an exercise program. The exercise program was progressive and consisted of: active range of motion exercises for the wrist and hand, elbow and shoulder; soft ball squeeze exercise; soft tissue stretches; passive mobilization (wherever required); gentle forearm, wrist, hand strengthening exercises and a home exercise programme.

Statistical analysis
The scores of MHQ and DASH were calculated and repeated measure analysis of variance (ANOVA) test was applied for comparison.

Standardized response means (SRM), which are used to measure responsiveness when data for which two time points in the same patients are being compared, were calculated by dividing the difference in mean scores by the standard deviation of the mean difference. According to Cohen et al, [8] a SRM of 0.2 is considered as small, 0.5 as medium, and 0.8 as large. All analyses were carried out using SPSS software version 17.

RESULTS

A total of 50 subjects participated in the study and completed the questionnaires at all the three points during the study. The sample consisted of 45 patients treated conservatively with reduction an immobilization in a plaster cast (90%).Two patients were treated surgically followed by immobilization (4%). Two patients were treated with inter fragmentary K wires (4%). One patient was treated with an external fixator (2%).
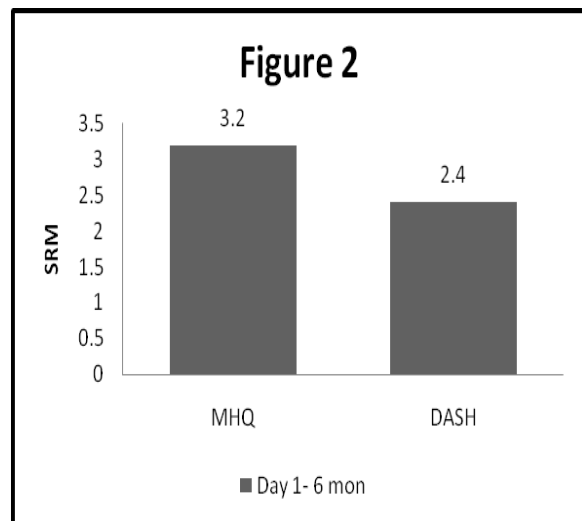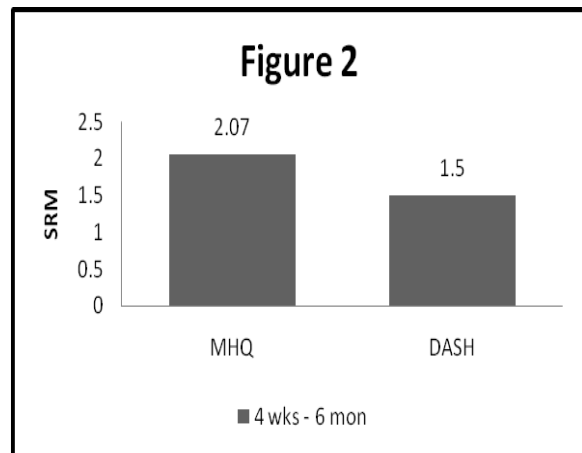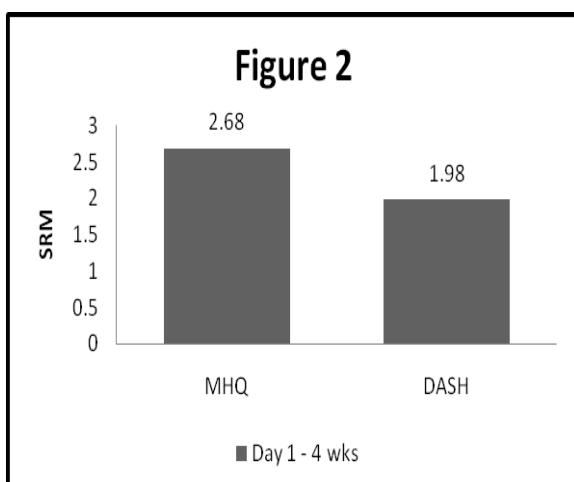
The mean age of study participants was 49.98 ± 11.79.

Mean scores of MHQ and DASH at all the three times are depicted in Figure 1.
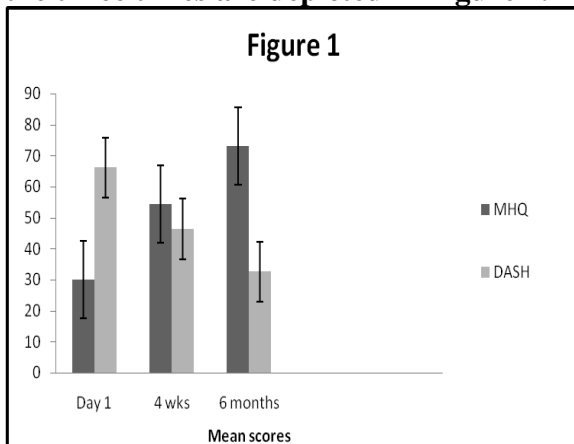
Figure 1

n=50, *Error bars* represent standard deviation

Standardized Response Mean (SRM) of MHQ and DASH at all the three points are depicted in Figure 2

Figure 2 — Day 1 - 4 wks

Figure 2 — 4 wks - 6 mon

Figure 2 — Day 1- 6 mon

DISCUSSION

In this study we calculated and compared responsiveness of MHQ and DASH questionnaire in patients with distal radius fracture receiving physiotherapy. We found that both MHQ and DASH were responsive to detect clinical changes during distal radius fracture rehabilitation. This finding is consistent with the study in hand and wrist surgery. [9]

Looking at the entire time frame of study, we found high SRM values for both MHQ and DASH during day 1 – 4weeks and day1 – discharge (≤6months) time period. This finding in our study is consistent with the study in distal radius fracture by MacDermid et al. [10] who investigated the responsiveness of the DASH in distal radius fracture outcomes, reporting extremely high SRMs for both 0- to 3-month and 0- to 6-month periods. The possible explanation for our findings could

be that during the first 4 weeks the aim of physiotherapy management is to decrease pain, oedema, and prevention of complications like complex regional pain syndrome. Thus, having addressed the above goals may have reflected in the scores leading to a higher SRM values. During day 1- discharge ($\leq$ 6 months) which is the entire duration of study, here, the whole time frame is more leading to a magnitude effect, which may have been reflected in the higher SRM values. Furthermore, Kotsis and Chung [11] investigated responsiveness of MHQ in 47 patients with distal radius fracture. They concluded extremely high SRM of all the MHQ components during 3 months to 6 months period. Thus, the findings in our study reinforce the results of Kotsis and Chung; and MacDermid et al.

Also, the SRM values of MHQ were higher than that of DASH during all the three times suggesting that MHQ may be more responsive than DASH in patients with distal radius fracture. This finding is somewhat consistent with the study in carpal tunnel surgery. [12] The MHQ exhibited higher responsiveness as compared to DASH. While reasons for this remain elusive, one possible explanation could be that the MHQ is able to detect symptom improvement and functional improvement as separate scales, giving a more detailed picture of how and why the patient is or is not improving. Since hand function is affected by hand dominance, and MHQ addresses each hand separately, thus it may be able to reflect performance of involved hand better. Whereas, DASH does not have any items on the aspect of hand, and does not take into account the hand dominance.

CONCLUSION

We have found that each instrument is responsive during a 6 month follow up after distal radius fracture treatment, clarifying the applicability of both outcome measures related to outcome studies of distal radius fracture. However, MHQ may be preferably used over DASH in outcome studies of distal radius fracture.

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