Development of a score for assessing severity, predicting interventions and prognosis of musculoskeletal disorders

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Abstract. Musculoskeletal disorders (MSD's) are a constellation of disorders. There is no single tool available which guides the clinicians to predict the severity, intervention and recovery period of the patients who is suffering from different musculoskeletal disorder. In this paper authors tried to categorize the severity of the musculoskeletal discomfort and the prognosis of the recovery period. The questionnaire was formulated using different epidemiological risk factor of the development of MSD and the effect of MSD on physical and psychosocial factors. The questionnaire contains 13 questions which include seven direct (rating was 0, 2, 4, 6, 8 and 10) and six indirect (rating was 0, 1, 2, 3, 4 and 5) questions. Results revealed a significant correlation with the prognosis of recovery and the actual recovery period (r= 0.80). It also showed a significant correlation between the total severity score and the actual recovery (r=0.82) period. Depending on the prognosis of the recovery the severity score was segregated in four categories as mild, moderate, severe and complicated. Due to small sample size the prognosis of recovery for higher severity score could not be plotted.

Key words: "DEEPAK SHARANS"; "Outcome"; "Validity"

1. Introduction

Musculoskeletal disorders (MSD's) are a constellation of disorders which involves muscle, fascia, tendon and/or neurovascular structures of neck and upper limb; but any part of the body may be affected. Work Related MSDs are often not identified and treated early in their development, leading to severe injuries and disabilities that create a significant financial burden, which includes both the cost of treatment and lost work time. Currently there are no universally accepted or validated tools or scores for determining the severity and prognosis of MSD. Among the available scores, usually a single factor such as pain was considered to determine the severity and prognosis of MSD [4,10]. From author's experience of assessing and treating over 100,000 patients with MSD at a tertiary level neuro-musculoskeletal rehabilitation centre in the last 10 years (2001-11), we have identified several direct and indirect factors which contribute to the severity and prognosis of MSDs.

2. Objective

The aim of this study was to develop and validate a score for assessing the severity, predicting

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interventions and the prognosis of recovery period from MSD's.

3. Methods

The score for determining the severity and prognosis of MSD was named "DEEPAK SHARANS Musculoskeletal Disorder Severity Score" which is the acronym of the first letter of the respective factors affecting the severity and prognosis. The severity section consisted of following questions: **D**uration of symptoms, **E**ffects on activities of daily living (ADL), **E**xertion level (use of physical energy/hard work) during work, **P**ain intensity, **A**bility to maintain speed of work, **K**nown physical health issue, **S**tress, **H**ours of continuous work per day, **A**rea affected, **R**estricted movements of affected area, **A**ctivity restriction during work (at office or at home), **N**erve related symptoms and **S**leep disturbance due to pain. There were 7 direct and 6 indirect factors/items. Each item contained six statements in increasing severity, e.g., 0 being least severe and 5 being most severe. Scoring of statements in direct section was 2, 4, 6, 8 & 10 and indirect section was 1, 2, 3, 4 & 5. The total score could range from 0 to 100. According to the total or final score the severity, prognosis and recommended interventions were graded. Expert validation was performed by 5 specialists in Ergonomics and Musculoskeletal Disorders using the Delphi Method. The score was then distributed to the subjects before the consultation with the physician and initiation of treatment. The physician was blinded to the calculation of the score. The final score of the subjects diagnosed with MSD's was correlated with the severity of MSD, interventions prescribed and the total duration of recovery.

4. Results

A pilot study was conducted among 40 participants with mean age 41.5 ± 13.4 years. The Severity score showed an excellent validity in predicting severity and prognosis ($r = 0.80$) of MSD. There were significant correlation between direct score and the prognosis of recovery period ($r = 0.82$) and actual recovery ($r = 0.79$). The results also revealed that there was a significant correlation between the prognosis and the actual recovery period ($r = 0.96$) among MSD patients. The total severity score was significantly correlated with the duration of actual recovery ($r = 0.82$).

Table 1

Correlation Analysis

	Total Score	Direct Score	Indirect Score	Predicted Recovery	Actual Recovery
Total Score	1				
Direct Score	0.95**	1			
Indirect Score	0.41**	0.18	1		
Predicted Recovery	0.80**	0.82**	0.31*	1	
Actual Recovery	0.82**	0.79**	0.37*	0.96**	1

'**' – Significant at the level of p< 0.001

'*' – Significant at the level of p< 0.05

The Predicted and actual recovery period was plotted against the Total Severity score which are presented in Figure 1 & 2. The regression analysis revealed a typical pattern of recovery period (Predicted and Actual) when computed against the total severity score. It showed that recovery period varies from 2 weeks to more than 5 weeks as severity score varies from <20 to >60. It gives distinct stages as severity score increases. The stages of recovery period were according to the severity score. Depending on the prognosis of the recovery the severity score was segregated in four categories: Mild, moderate, severe and complicated is presented in Table 2.
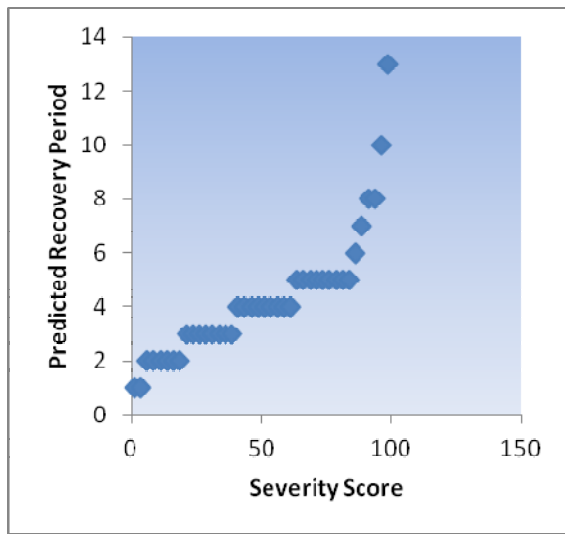
Figure 1.

Normal probability plot: Predicted recovery period against severity score
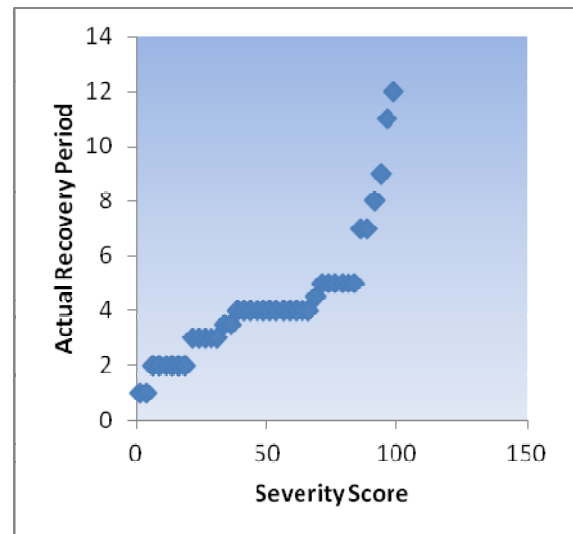

Figure 2.

Normal probability plot: Actual recovery period against severity score

Table:1

Categorization of severity score

Severity	Severity Score	Prognosis of recovery period	Actual recovery period
Stage 1:Mild	<20	2 weeks	2 weeks
Stage 2:Moderate	20 – 40	3 weeks	3 – 4 weeks
Stage 3:Severe	40 – 60	4 weeks	4 weeks
Stage 4: Complicated	≥60	≥ 5 weeks	≥ 5 weeks

5. Discussion

There are studies which revealed that severity of the musculoskeletal problems has an effect on activities of daily life. Activities of daily life impaired as severity and complexity of the discomfort increases [1,11,12]. Intensity of pain or discomfort is positively associated with severity of the discomfort. Several studies are there which evaluate the intensity of musculoskeletal pain or discomfort and reported that higher the intensity, higher the level of severity of the Musculoskeletal discomfort [5]. Intensity of pain is a measure of improvement of any ergonomics intervention or treatment strategy [7,8]. Literature revealed that providing a micro-break can reduce the musculoskeletal discomfort and can improve the speed and accuracy of work [6]. Severity of musculoskeletal disorders is associated with work related stress [2,3,15]. Therefore inclusion of intensity of stress to develop the severity rating was

necessary. Duration of exposure to any particular work activities (occupational or domestic) is a determining factor of the prognosis of the development of musculoskeletal disorders. As the duration of exposure increases the risk of the development of musculoskeletal disorders also increases [9,13]. A study revealed that work related musculoskeletal disorders can result in muscle, tendon and nerve related symptoms leading to activity restriction during work [14]. Thus exertion level, duration of exposure, stress level have impact on the development of different musculoskeletal disorders which in turn may affect daily activities, level of pain intensity, ability to maintain the speed of work, movement flexibility, sleep disturbances etc. Therefore, the restricted movements and nerve related symptoms increases the severity of musculoskeletal disorders. There are questionnaires which gives a broad guideline about the prevalence and the degree of severity of the musculoskeletal

problems. But those tools cannot give the prognosis of the treatment regimen and duration of recovery. Including all these factors in a single questionnaire and prediction of the level of severity is rare in literature. This is the first attempt to predict the severity and then predicting the recovery period is the novelty of the development of this questionnaire.

6. Limitation

As the sample size was less, the higher level of severity and recovery could not be analyzed. The data was less for the severity scoring of more than 60, therefore, relation between the severity and prognosis of recovery could not be plotted in actual. The prediction was possible by extrapolating the probability graph. A study need to be conducted on the larger sample size. The validation of the categorization also could not be done due to small sample size.

7. Conclusion

DEEPAK SHARAN's severity score is a comprehensive and valid assessment tool to determine the severity, prognosis of recovery and to suggest the appropriate intervention for work related MSDs.

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