RELATIONSHIP BETWEEN THE SEVERITY OF HAND INJURY, ACTIVITY LIMITATION, AND LEVEL OF DEPRESSION

1 Dr. Vinoth Kumar. T, MOT (Hand & Musculoskeletal Conditions)  
2 Dr. Raghuram.P, MOT (Paediatric)  
3 Dr. Shovan Saha, Ph.D.(OT)  
1 Lecturer,  
2 Asso. Prof.& HOD,  
3 Asso. Prof.  
1 Faculty of O.T, SRIHER, Chennai,  
2 Faculty of O.T, SRIHER, Chennai,  
3 MCHP, MAHE, Karnataka

Abstract: This study has been undertaken to Determine the Relationship between the severity of hand injury, activity limitation, and level of depression with objective of exploring the relationship between the severity of hand injury, activity limitation, and level of depression. Data were collected from 52 Hand injury Patients who are referred to the occupational therapy department, in Sri Ramachandra Hospital, Chennai, Tamil Nadu, India based on inclusion and exclusion criteria which include. Then with appropriate informant consent, the following measures such as Modified Hand Injury Severity Score scale (MHISS) excluding Integument component, Disability of Arm, Shoulder, Hand Outcome Questionnaire (DASH), Patient Health Questionnaire -9 (PHQ-9) was administered, and data were collected. The collected data were later summarized using descriptive statistics, SPSS version 16 was used for statistical analysis and spearman’s correlation coefficient method was used to find the association between the factors. Based on the analysis, we found that there is a moderate correlation between the activity limitation and level of depression ($r=0.4520$, $p=0.001$), a weak correlation between the severity of hand injury and activity limitation ($r=0.245$, $p=0.080$) & weak correlation between the severity of hand injury and level of depression ($r=0.174$, $p=0.217$).

Keywords: Distress, Depression, Hand Injury, hand Injuries, Traumatic Hand Injuries, Ortho, Orthopedics, Orthopedic, Activities, Activities of Daily Living, ADL, Work, Hand Fractures, Occupation, Activity Limitation, Upper Extremity.

INTRODUCTION

Hands are an integral part of what defines us as human beings. The human hand is extremely complex and often challenging to comprehend its use. They help us to participate in work, play, self-care, and social interactions and that unique part of the body allows us to accomplish infinite tasks and fulfil our roles. Injury to hand structure can have a physical and functional disability in our daily life that can often be devastating to us as human beings.

In this study, hand injuries are injury to hand and forearm structures based on Modified Hand Injury Severity Score criteria excluding integument component and activity limitation are the difficulties an individual may have in executing activities”

In 2011, Bell, Gray, and Kingston reported that 63.9% of participants who had upper extremity injury had slight or no difficulty in their daily activities and 36.1% of participants had moderate to extreme difficulties in their daily activities. An observational study conducted by Dekkers and Nielsen, found that 70 % of the participants are found to have activity limitations. Out of which 38% were related to self-care activities, 52% are related to productivity, and 10% were leisure. A cross-sectional study conducted by Bailey and their colleagues, found that 78.9% of the participants with upper extremity injury experienced activity limitations in their daily life.
Difficulty in accomplishing these daily activities can lead us to a lack of self-confidence, incompetence, and dependency altogether may impact our psychological status as a social being. Sometimes these injuries to the hand can often be a distressing experience that might even affect our physical, emotional and social stability. In 2017, a scoping review conducted by MacDermid, Valdes, Szekeres, Naughton, and Algar reported that depression is the most common psychological problem among upper extremity injury patients. Activity limitation and depression. In 2009, Bailey, conducted a cross-sectional study and found that 39% of the participants with upper extremity nerve injury had clinical depression. In 2014, Dogu and their colleagues discovered that in the acute stage (i.e. first 3 months of the postsurgery period) 66.5% of participants had minimal to severe depression. In 2011, Gong found that 48% of distal radius fracture patients had major depressive disorder at 2 weeks post-injury. Beleckas. In 2017, they assessed 3315 upper extremity injury patients from June 2016 to November 2016 with Patient Health Questionnaire - 9 (PHQ-9) and reported that 9.5% (i.e., 315 out of 3315) of the participants had clinical depression after the incidence of injury.

Although from the literature it is evident that the level of depression, activity limitation, and severity of hand injury plays a key role in influencing the functional outcome for an injured hand, often these have been studied in isolation, therefore it was felt worthwhile to understand the relationship between these elements in a single study.

**OBJECTIVES**

- To correlate Disabilities of the Arm, Shoulder, and Hand Outcome Measure Score and Modified Hand Injury Severity Score.
- To correlate Modified Hand Injury Severity Score and Patient Health
- To correlate Disabilities of the Arm, Shoulder, and Hand Outcome Measure Score and Patient Health

**METHODOLOGY**

**Study population:**
Data were collected from 52 Hand injury Patients who are referred to the occupational therapy department, in Sri Ramachandra Hospital, Chennai, Tamil Nadu, India based on inclusion and exclusion criteria which include;

**Inclusion criteria:**
- Hand injury as per MHISS criteria
- Post-injury from starting of 2nd month to end of 4th month
- Either dominant or non-dominant hand
- Age:18 years - 30 years

**Exclusion criteria:**
- Bilateral hand involvement
- Participants had an existing psychological and cognitive issues
- Past history of existing hand disability
- Patients with multiple injuries other than upper extremity injuries

Then with appropriate informant consent, the following measures such as Modified Hand Injury Severity Score scale (MHISS) excluding Integument component, Disability of Arm, Shoulder, Hand Outcome Questionnaire (DASH), Patient Health Questionnaire -9 (PHQ-9) was administered, and data were collected.
The collected data were later summarized using descriptive statistics, SPSS version 16 was used for statistical analysis and spearman’s correlation coefficient method was used to find the association between the factors.

**The severity of hand injury**

Modified Hand Injury Severity Score is designed by Urso-Baiarda and his colleagues in 2008. It is a modified form Hand Injury Severity Score to include forearm, and wrist injuries along with hand injuries. In this scale hand and forearm injuries are divided into four parts Integument, Skeletal, Motor, and Neurovascular (ISMN). Each ISMN component comprises both absolute scores and weighted scores according to the functional significance of the affected ray. The scores are doubled if there is a presence of wound contamination, crush, avulsion, or compound fracture. In amputations, all lost structures are rated as damaged. If MHISS scores <20 it is considered a minor hand injury, MHISS 21–50 a moderate hand injury, MHISS 51–100 a severe hand injury, and MHISS >101 a major hand injury.

**Activity limitation:**

The Disabilities of the Arm, Shoulder, and Hand Outcome Measure (DASH) is a self-report outcome measure established by the American Academy of Higher Education in partnership with another organization, it contains 30 items that are designed to evaluate the patient’s health status during their preceding week. It includes 21 items that measure the different degrees of difficulty in performing some activities which are related to arm, shoulder, and hand problems, 5 items related to activity-related pain, weakness, tingling & stiffness, and 4 items which measure the social functioning, sleep, work, and self-image. These items are scored based on five responses (no difficulty, mild, moderate, severe difficulty, and unable to perform), in this total DASH score ranges from 0-100 (0-indicates no disability, 100 indicates severe disability). It also holds twooptional, four-item modules that are intended to measure the symptoms and capabilities of athletes, artists, and other workers. The importance to notice is that it cannot be calculated if there are greater than 3 missing items (Williams, 2014). Its reliability and validity include test-retest reliability (interclass correlation coefficient = 0.96), internal consistency (Cronbach alpha coefficient above 0.9), and the DASH was found to correlate with other measures (r > 0.69) and to discriminate well which indicates the validity of the scale.

**Level of depression:**

The PHQ-9 is modified from PRIMED TODAY, established by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke, and colleagues (The MacArthur Initiative on Depression Primary Care - Resources for Clinicians, n.d.). It is an evaluation tool used to screen, evaluate and measure the severity of depression. This brief self-report tool integrates DSM-IV depression diagnostic criteria with other leading major depressive symptoms. Its internal consistency is high (Cronbach alpha of .86 and .89). It has a sensitivity of 88% and a specificity of 88% for major depression. Its score of 5-9 is rated as minimal symptoms,10-14 as minor depression, 15- 19 as major depression (moderately severe), and more than or equal to 20 is rated as major depression (severe).
**DATA ANALYSIS**

The collected data were later summarized using descriptive statistics, SPSS version 16 was used for statistical analysis and spearman’s correlation coefficient method was used to find the association between the factors.

| Table 1: |
|---|---|---|
| Frequency | Percentage |
| N=52 |
| Gender | Male | 46 | 88.5% |
| | Female | 5 | 11.5% |
| Diagnosis | Osseous injury | 35 | 67.3% |
| | Soft tissue injury | 17 | 32.7% |
| Occupation | Earning member | 33 | 63.5% |
| | Non-earning member | 19 | 32.5% |
| Treatment method | Surgical | 49 | 94.2% |
| | Non-surgical | 3 | 5.8% |

The mean age of the sample population in this study is 26.11 (± 4.0) years and the mean duration post-injury is 52.11(±24.2) days.

| Table 2: |
|---|---|---|---|
| Mean and SD | Median | Interquartile Range | Mode |
| DASH | 65.79 ± 20.06 | 6 | 7 | 0 |
| PHQ-9 | | | | |
| MHIS | | 12 | 16.5 | 20 |

| Table 3: |
|---|---|---|
| N | r-value | p-value |
| DASH and PHQ-9 | 52 | 0.452 | 0.001 |
| PHQ-9 and MHISS | 52 | 0.174 | 0.217 |
| MHISS and DASH | 52 | 0.245 | 0.080 |

**RESULTS**

This study aimed to examine the relationship between the severity of hand injury, activity limitation, and level of depression.

The result of this study indicated that there is a moderate positive correlation between activity limitation and level of depression which means if activity limitation increases in the hand injury patients' level of depression in them decreases. This result is reported similarly in previous studies. Also, it was noted that depression creates a negative impact on patients' overall quality of life.

The result also indicated that there is a weak positive correlation between the severity of hand injury, activity limitation, and level of depression. It was observed that the weak correlation between MHISS score and DASH score is due to MHISS scores the impairment
objectively and the DASH score and PHQ- 9 score are based on participants' subjective interpretation of activity limitation. Subjective perception about their activity limitation varies from person to person based on their age, gender, occupation, and socioecononic status. This information is supported by previous literature, in their study they found that hand injury severity does not correlate with the activity limitation of the patients and explained that patients' beliefs about the illness influence their activity limitation score. Also after two months of injury, factors such as increased activity participation status, and reduction in the intensity of pain are suggested to influence the psychological compliance and functional recovery of the patients but the hand injury severity score remains the same even after two months of injury period.

In the current study, it was that observed participants between the age of 20 to 25 years who are students by their occupation had a greater level of depression, concerning injury regardless of their severity of hand injury, also it was observed that seeing their abnormal appearance of hand was reported to be psychological disturbing which is supported by de souse and their colleagues based on the review of 209 studies they have discussed that abnormal physical and social appearance after the injury affects the mental status of the person, the further research is needed to confirm this information of hand injury experiences and psychological status among students between the age group of 20 to 25.

In the current study participants who had an osseous-related injury (67.3%) were more compared to those with soft tissue injury and almost 95% of the osseous injury was stabilized using surgical procedures. In the current study, it was observed that according to MHISS criteria the osseous injury such as radial and the ulnar bone fracture had a higher score than soft tissue injuries such as flexor digitorum superficialis, flexor digitorum profundus, and extensor digitorum communis, but the activity limitation was more flexor digitorum superficialis, flexor digitorum profundus and extensor digitorum communis than radial and ulnar fracture after 3 month period of injury. There is no clear evidence supporting this comparison, but this information is supported by two studies one of which is the systematic review conducted by Resnik, Borgia, Silver, and Cancio on 260 articles, based on the review of studies related to radius fracture who have used DASH score to measure their participant's functional outcome, they reported that DASH score(mean score 7±5) decreases after 3 months of injury in patients with radius fracture though sometimes it may differ based on the surgical procedures done to that patient and in another retrospective study conducted by Starnes, Saunders, and Means, they assessed the functional outcome of the zone II flexor tendon injury patient using quick DASH scale after 3 months of injury, they have reported that patients had a mean score of 26.2±16.8, which is more compared to the score reported by Resnik, Borgia, Silver, and Cancio [15] for radius fracture patients after 3 months of injury.

The current study was conducted from the start of the 2nd month to the end of the 4th month after the injury, invariably these criteria affected the significance and correlation coefficient of the study. It was observed patients who were reported during the early period of hand injury i.e., (2nd to mid of 3rd month) whether the severity of hand is more or less, had more activity limitation score and more depression. Also, patients who reported during the late period of their injury (i.e., mid of 3rd month to the end of the 4th month) whether the severity of hand injury is more or less according to MHISS criteria, scored to have less activity limitation and level of depression, as the days progress after the injury the activity
participation of individuals increases, the intensity of pain decreases, psychological disturbances such as hopelessness, low self-esteem, and sleeping disturbances decreases but the severity of injury according to MHISS criteria remains the same. This information was reported similarly in previous literature.

**CONCLUSION**

In this study, we aimed to find the relationship between the severity of hand injury, activity limitation, and level of depression, we found that there is a moderate correlation between the activity limitation and level of depression and a weak correlation between the severity of hand injury, activity limitation, and level of depression. Based on this analysis we conclude that the relationship between the severity of hand injury, activity limitation, and level of depression is poor also severity of hand injury has minimal influence on the level of depression and activity limitation.

**REFERENCE**