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#### **RESEARCH ARTICLE**

#### "ASSOCIATION OF MICHIGAN HAND OUTCOMES QUESTIONNAIRES AND THE MODIFIED KAPANDJI INDEX IN RHEUMATOID HAND"

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### Manuscript Info

#### Abstract

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*Key words:* Hand disability; RA; MKI; MHQ. **Background:**The Michigan hand outcomes questionnaire (MHQ) is a hand specific outcomes instrument, which measures the health outcomes of patients with chronic hand conditions. The MHQ contains six distinct scales (1) overall hand function (2) activities of daily living (3) pain (4) work performance (5) aesthetics and (6) patient satisfaction with hand function.

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The modified kapandji index (MKI) measures hand mobility and uses anatomic landmarks of the hand as references, and at the end of examination, it is possible to determine overall hand mobility.

Although both are used to evaluate hand function in patients with RA, there are variations in their conceptual background as MHQ is subjective and a Functional scale and the MKI is objective and structural tool and there is difference in criteria of scoring. Since the relation between these instruments has not been studied, the aim of this study is to quantify the association between these functional and structural tools.

#### **OBJECTIVES**

-To correlate MHQ and MKI

-To correlate MKI with the subscales of MHQ

**METHODS:** A total of 83 subjects participated on the study. Subjects were 21 males and 62 females. Patients who meet the criteria for the diagnosis of rheumatoid Arthritis were included in the study. Patients who had Fractures in forearm, and hands, neuromuscular conditions affecting the hands were excluded.

Patients were administered with the MKI and MHQ respectively.

**RESULTS:** Results showed that the MHQ and MKI have a strong correlation. The MKI correlates well with Hand function and ADL and moderately correlates with work satisfaction, Work performance, and aesthetics and has no correlation of MKI with pain subscale.

**INTERPRETATION AND CONCLUSION:** From the study it was concluded that MHQ and MKI have a strong correlation indicating that as the ROM of hand is limited the ability or the health state domains of patients with rheumatoid hand deteoriates. The MKI has good correlation with Hand function and ADL and moderate correlation with work satisfaction, aesthetics and Work performance and has no correlation of MKI with pain subscale.

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### Introduction

Rheumatoid arthritis (RA) is a chronic immunoinflammatory disorder of unknown etiology, characterized by symmetric polyarthritis, constitional features and sometimes multisystem involvement.<sup>1</sup>

RA is a systemic illness of unknown origin affecting approximately 1% to 2% of population worldwide.<sup>2</sup> Prevalence of RA in rural Indians is reported to be 0.75% by Malaviya et al.<sup>3</sup>

Loss of ROM of the hand, pain, swelling, muscular weakness and deformity also leads to decreased grip strength which compromises grasp and fine manipulation and alters hand function.<sup>4</sup>The resultant deteoration in hand function greatly affects a patient's way of life and independence.<sup>5</sup>

Clinical evaluation of disease activity in RA is based on subjective, semi-objective and objective variables which form the basis of weighed scales.<sup>6</sup>There is no gold standard for measuring disease activity in RA and multivariate analysis is recommended by some workers.<sup>7</sup>

The importance of muscle weakness to disability in patients with RA has long been recognized<sup>8</sup> and controlled exercise to maintain or increase muscle strength is considered as the cornerstone of comphrensive treatment in RA.<sup>9</sup> However there are little quantititative data on the relationship of muscle weakness and physical functional disability.<sup>10</sup> Physical functional disability in RA can be measured with a variety of psychometrically sound health status instruments.

Currently Modified kapandji index (MKI) an objective tool which measures overall hand mobility and to assess the severity of impairment in global hand mobility and the responsiveness of surgical treatments on hand .The reliability and validity of MKI for assessment of functional mobility of the rheumatoid hand is established.<sup>11</sup>Hand surgeons use a modified the kapandji index that assesses opposition of the thumb and flexion and extension of long fingers . This index does not require angular measures of joint mobility because the scoring system uses anatomic landmarks of the hand as references, and at the end of the examination, it is possible to determine overall hand mobility, and the responsiveness of surgical treatments to this parameter. MKI is inexpensive, safe quick and easy to use.<sup>13</sup>

A recently developed Michigan hand outcomes questionnaires (MHQ) which is a hand specific outcomes of patients with chronic hand conditions for assessment of chronic hand conditions are widely used. The MHQ is a hand specific outcomes instrument, which measures the health outcomes of patients with chronic hand conditions. The MHQ contains six distinct scales (1)overall hand function (2)activities of daily living (3)pain (4)work performance(5)aesthetics and(6)patient satisfaction with hand function. There is also a demographic section asking questions about patient's age, sex, etc. The given demographic section contains basic questions, which will describe the sample population. The MHQ has a total of 67 questions<sup>12</sup>. The MHQ is a reliable and valid instrument for measuring hand outcomes. It can be used in a clinic setting with minimal burden to patients. The questions in MHQ have undergone rigorous psychometric testing, and the MHQ is a promising instrument for evaluation of outcomes following hand surgery.

Although both outcome measures have been used to evaluate hand function in patients with RA, there are considerable variations in their conceptual background as MHQ is subjective and a Functional scale and the MKI is objective and structural tool and there is difference in criteria of scoring. Since the relation between these instruments has not been studied, the aim of this study is to quantify the association between these functional and structural tools.

## **Material and Methods**

The source of patients data were from outpatients from Department of Rheumatology and Immunology and Department of Physiotherapy at M S Ramaiah Medical College and Hospital, Bangalore and Outpatients from Chanre Rheumatology and Immunology research center, Bangalore

Patients who meet the criteria for the diagnosis of rheumatoid Arthritis defined by American college of rheumatologists. (The 2010 ACR\_EULAR classification criteria for Rheumatoid Arthritis) were included in the study

Patients who had recent fractures in distal part of forearm, wrist and hands and Neuromuscular conditions affecting the hands were excluded from the study

A total of 83 subjects participated on the study. Subjects were 21 male with a mean age of 59.5(SD=4.85) and 62 females with a mean age of 46.52(SD=11.18). All patients were referred to the investigator at the outpatient departments of the hospitals mentioned above.

The referring physician was aware of the inclusion and exclusion criteria and only patients who fulfilled the criteria were taken for the study. The subjects were first informed about the nature of study and an informed consent was taken from them before the commencement of the study. The subjects were first administered the modified Kapandji index. The MKI score was obtained by summing of 3 tests.

The patients were then given the Michigan Hand Outcomes Questionnaire to assess the patient's general hand condition.

# Results

Statistical analysis was done using the SPSS package version 10.0.

Spearman's product correlation was used to correlate the data, as the Michigan Hand Outcomes Questionnaire and the Modified Kapandji Index are ordinal scales.

p value was set at p=0.05 level of significance

#### Table 1.Correlation of Modified Kapandji Index and Michigan Hand Outcome Questionnaire

Spearman's Correlation	MHQ	P Value
MKI	-0.865**	0.05
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Correlation is significant at 0.05 level (2-tailed)

The above table shows a high level of correlation(r=-0.865) between the total scores of Modified Kapandji Index and Michigan Hand Outcome Questionnaire.

#### Table 2. Correlation of Modified Kapandji Index and Hand Function Subscale.

Spearman's	Hand function	P
Correlation	Subscale	Value
MKI	-0.818**	0.05

\*Correlation is significant at 0.05 level (2-tailed)

The above table shows a high level of correlation(r=-0.818) between the total scores of Modified Kapandji Index and Hand Function Subscale.

### Table 3. Correlation of Modified Kapandji Index and ADL Subscale

Spearman's	ADL subscale	P Value
Correlation		
MKI	-0.913**	0.05

\*\*Correlation is significant at 0.05 level (2-tailed)

The above table shows a high level of correlation(r=0.913) between the total scores of Modified Kapandji Index and ADL Subscale.

#### Table 4. Correlation of Modified Kapandji Index and Work Performance Subscale

Spearman's	Work performance	P
Correlation	Subscale	Value
MKI	0.622**	0.05

\*\*Correlation is significant at 0.05 level (2-tailed)

The above table shows a moderate correlation(r=0.622) between the total scores of Modified Kapandji Index and Work Performance Subscale.

### Table 5. Correlation of Modified Kapandji Index and Aesthetics subscale

Spearman's	A anthotics subscale	P
Correlation	Aesinetics subscale	Value
MKI	-0.515**	0.05

\*\*Correlation is significant at 0.05 level (2-tailed)

The above table shows a moderate correlation(r=-0.515) between the total scores of Modified Kapandji Index and Aesthetics subscale

#### Table 6. Correlation of Modified Kapandji Index and Pain subscale

Spearman's Correlation	Pain subscale	P Value
MKI	0.264	0.087

NS = Not Significant

The above table shows that there is no correlation (r=0.264,p=0.087) between the Modified Kapandji Index and Pain subscale.

#### Table 7. Correlation of Modified Kapandji Index and Work Satisfaction Subscale.

Spearman's	Work satisfaction	Р
Correlation	Subscale	Value
MKI	-0.671 **	0.05

\*Correlation is significant at 0.05 level (2-tailed)

The above table shows a moderate correlation(r=-0.671) between the total scores of Modified Kapandji Index and work satisfaction subscale.

### Discussion

Adverse outcome is the suffering or loss of health experienced by an individual as a result of the process of the disease and in rheumatology research is normally quantified numerically. Patients with RA and those involved in the care and treatment also need other forms of information on how the disease may affect major aspect of their lives. Such details provide a basis of discussion with patients concerning practical issues and prognosis.

In our study a high inverse correlation was obtained between the scores of the modified kapandji index and the Michigan Hand Outcome Questionnaire. This indicates that objective hand function tool MKI demonstrates strong relationship with subjective measure of hand function MHQ. The inverse correlation indicates that as the ROM of hand joints is progressively limited the ability or the health state domains of patients with rheumatoid hand deteoriates. This correlation could be because both the tools are validated of measuring hand function. In MKI higher scores indicate a better hand ROM and a lower score indicates a better hand. This could be the cause of negative correlation.

We found a moderate correlation between MKI and hand function subscale indicating that poorer hand function is associated with limitation of finger ROM supporting general agreement is surgical and therapy literature that limitation of hand ROM are linked with poor hand function.

Our study found that MKI has a good correlation with ADL subscale. This could be because the deformity caused by the disease affects every day hand function like dressing grooming, eating, reaching and gripping and the ADL

activities require a normal mobile hand. However given the good correlation these measures alone do quantify or predict the degree of hand disability.

We found a moderate correlation between MKI and Work performance subscale. This could be because of the crosscultural differences and the type of work done by the people. The work demands of a white collared man can be different from that of a laborer and the type of grip varies depending on the type of the job. The objectives measured by MKI are limited to structure of hand and bears no relation to function of hands. The questions in Work performance subscale are not specific to the various works done by different types of people.

We also found a moderate correlation between MKI and aesthetics subscale. This could be because the deformities in RA are progressive in nature and the patient with chronic RA by then would have accepted the state of his hand. The patients feeling of his hand may wary on their cross-cultural differences. The MKI measures the limitation of hand ROM and thus does not specifically measure the type or amount of deformities in RA.

We found that there is no correlation between MKI and pain. This could be explained by the clinical observation that patients with chronic RA learn to live and function despite ongoing pain. The MKI is a structural tool and measures the limitation of hand ROM and unlike other tools like RAI, ACR does not assess pain level. The unreliability of absolute values in pain scale may also contribute to this poor association

Our study also found that MKI has moderate correlation with work satisfaction subscale. This may be because the patients with chronic RA learn to adapt to functions with their deformed hand and are reasonably satisfied with their work performance in relation to the limited hand ROM they possess. The MKI measures hand ROM and has no relation with the psychological status of the person. The work satisfaction subscale has other components like strength, pain and sensation of hand, which are not related to the hand ROM, thus giving a moderate correlation. One of the limitations of our study was the small sample size. Future research can be done on large sample size and two point assessment study can be carried out to increase the accuracy of the results.

# Conclusion

In our study we found that the Michigan hand outcomes questionnaires (MHQ) and Modified kapandji index (MKI) have a strong association. Our study further correlated Modified kapandji index MKI with various subscales of Michigan hand outcomes questionnaires MHQ. We found that the MKI has good correlation with Hand function subscale and ADL subscale and moderate correlation with work satisfaction subscale, Work performance subscale, and aesthetics. Our study found no correlation of MKI with pain subscale.

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