

ORIGINAL ARTICLE

Diagnosis of Stage II Rheumatoid Arthritis through Functional Evaluation of Wrist and Hand among Adult Females

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ABSTRACT

Background: Rheumatoid arthritis (RA) is a commonly prevailing disease among women. Disease progression deformities such as ulnar and radial shift of the wrist, Boutonnière, swan neck deformity and mallet finger become evident, which results in marked limitation of hand function. Patients usually lose the ability to hold, grasp and pinch thus activities of daily living are compromised. This study aimed to diagnose stage II Rheumatoid Arthritis through assessing the limitations of hand functions in adult females.

Methods: A sample of 37 adult females with Stage II RA presenting to the rheumatology department of National hospital, Lahore and Combined Military Hospital, Lahore were recruited in the study. Patients with clinically diagnosed Stage II RA presenting with pain and dysfunction of the hands and wrist joints were included. Patients with any traumatic condition or any other bone disease that limits hand function were excluded from the study. The scale used for the assessment was Patient Rated Wrist/Hand Evaluation (PRWHE) with the reliability of >0.75 and validity of 0.7.

Results: In a sample of adult women with a mean age of 42, 39% reported moderate pain and 61% had severe pain whereas the functional limitations was reported to be moderate in 47.3% while 52.7% had severe limitation of hand function. These results prove that there is a negative impact of hand malformations on hand function.

Conclusion: The adult females with stage II Rheumatoid Arthritis had severely limited hand function. The functional limitations of hand were increased with disease progression especially in adult females.

Keywords: Functional Limitations; Patient Rated Wrist/Hand Evaluation; Rheumatoid Arthritis.

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INTRODUCTION

Rheumatoid arthritis (RA) is signalized by symmetrical inflammation of the synovial membrane; it involves multiple joints, typically joints of hand and feet¹. The chronic inflammation may progress to the joint destruction, functional abnormality and disability². RA is mostly diagnosed clinically if any four of the following symptoms are evident ; morning stiffness, arthritis of 3 joint areas, arthritis of hand joints, symmetric arthritis, rheumatoid nodules, positive rheumatoid factor test, and radiographic changes³.

Course of rheumatoid arthritis is usually progressive and can be divided into three stages, starting from developing autoimmunity but no obvious clinical manifestations (stage I) and leading towards complete loss of mobility and permanent joint destruction and deformation (stage III)⁴. However, the disease course may differ depending upon certain variables including genetic background, frequency of inflamed joints and presence of antibodies in the serum^{5,6}. Other factors that interfere with patient's activities may also include illiteracy and heart disease like IHD⁷. The symptoms that develop due to RA have considerable physical and psychological impression on activities of daily living^{8,9}.

Global prevalence of RA is 0.24%¹⁰ while its prevalence in Pakistan is 0.5% with a strong predilection towards women, having a female to male ratio of 8:3¹¹. Deformities of hand leads to the inability to grip grasp or pinch, which leaves the patients with lack of skills to perform ADLs¹². Hand deformities, which are frequently observed in RA patients, are ulnar and radial deviation of the wrist, ulnar deviation of MCPs, volar subluxation of MCPs, boutonnière deformity, swan neck deformity and mallet finger^{13, 14}. This high yielding hand function requires explicating sensory input and correlating anatomical and physiological characteristics to complete the task. It has been proved that there is a noticeable deterioration in overall hand performance of RA patients especially in females¹⁵⁻¹⁷. The objective of the study was to assess the limitations of hand functions in adult females with stage II Rheumatoid Arthritis. The rationale of this study is to incorporate appropriate preventive and rehabilitative measures in the early stages of Rheumatoid Arthritis to preserve hand function as much as possible.

METHODS

An observational study was conducted on 37 patients, age ranging from 35 to 55 who had been diagnosed with stage II Rheumatoid Arthritis. The study was conducted after the approval from the ethical board of Lahore College of Physical Therapy ERC-LCPT/450 2019. Sample size was calculated using WHO sample size calculator, with prevalence being 0.5% (9), level of significance 1%, and margin of error 0.03. Thus, 37 patients who had been diagnosed with stage II Rheumatoid Arthritis, visiting rheumatology department of National hospital, Lahore and Combined Military Hospital, Lahore from August 2018 to January 2019 were recruited using non-probability convenience sampling. An informed consent was obtained from each subject who participated in this study. Respondent information sheet was explained to all subjects. The objectives and significance of study was also briefed. They were told that they have right to know about the results of study and can withdraw from it anytime.

The patients included in the study were adult females with clinically diagnosed Stage II RA presenting with pain and dysfunction of the hands and wrist joints due to RA. Patients with any traumatic condition (e.g., RTA) or any other bone disease that limits hand function (e.g., Osteoarthritis (OA), Systemic Lupus Erythematosus (SLE), Diabetes Mellitus (DM), etc.) were excluded from the study. Hand function and pain were measured using Patient Rated Wrist Hand Evaluation (PRWHE). The reliability of the PRWHE was calculated to be >0.75 and its validity was calculated to be 0.7, making it excellent tool for measuring hand function in RA.

The questionnaire consisted of two subscales of Pain, consisting of 5 questions (0 means no pain and 10 means maximum pain) and functional ability consisting of 6 questions based on specific activity and 4 questions based on usual activities (0 means no difficulty and 10 means maximum difficulty). To score individual subscales of PRWHE, the pain score was obtained by adding the 5 pain items (out of 50) and function score was obtained by adding the 10 function items and dividing by 2 (out of 50). The total score was obtained by adding the individually calculated scores of both subscales, with 0 being the best score and 100 being the worst score. The interpretation for pain was divided into minor (0-17), moderate (18-33) and severe (34-50) and for functional limitation was divided into mild (0-33), moderate (34-66) and severe (67-100). Data was analyzed using SPSS version 21. Descriptive statistics were reported and variables were presented in the form of tables and graphs.

RESULTS

In a sample of 37, mean age was 42 years with a standard deviation of 9.19. The minimum age was 30 years and maximum was 60 years. Demographics are presented in Table 1. Mean scores and standard deviations with normal values of ranges of various joint of hand and wrist are presented in Table 1. The mean of hand score was 37.6 ± 8.5 . The total score of hand tool ranges from 0 to 100 with 0 least disability and 100 as maximum difficulty in executing upper extremity tasks.

Table 1: Baseline, social characteristics and motion range in rheumatoid arthritis patients.

Characteristics	Status	Frequency	%	Mean \pm S.D
Marital Status	Married	32	86.4	2 \pm 0.65
Co-morbid Conditions	None	12	32.4	
	One	20	54.05	
	Two	5	13.51	
Duration of Disease (years)				

Functional Evaluation	Normal Range	Mean ± S.D
Hand Score	0 - 100	37.6 ± 8.5
Wrist Flexion	0 - 80 degrees	48.3± 12.4
Wrist Extension	0 - 70 degrees	44.2± 15.6
Ulnar Deviation	0 - 63 degrees	26.9± 14.8
Radial Deviation	0 - 35 degrees	13.5±7.4
Thumb Abduction	70 - 0 degrees	53.6±8.7
Thumb Extension	80 - 0 degrees	51±3.9
1st MCP flexion	10 - 55 degrees	47±5.4

The mean and standard deviation of wrist flexion came out to be 48.3 ± 12.4 whereas the normal range of motion for wrist flexion is from 0 to 80 degrees (Table 2). The mean score for wrist extension among art hritic females was found to be 44.2 ± 15.6 whereas the normal wrist extension ranges from 0 to 80 degrees. The mean score for ulnar deviation was 26.9 ± 14.8 whereas its normal value ranges from 0 to 63 degrees. The mean score

for radial deviation was 13.5 ± 7.4 whereas its normal value ranges from 0 to 35 degrees. Mean of thumb abduction was reported to be 53.6 ± 8.7 whereas its normal score ranges from 70-0 degrees. Mean of thumb extension was found to be 51 ± 3.9 among rheumatoid arthritic females while the normal range was from 80 to 0 degrees. The mean of 1st MCP flexion was 47 ± 5.4 and its normal range was 10 to 55 degrees.

Table 2: Cross-tab between pain intensity and functional limitation.

Pain Intensity	Functional Limitation			Total
	Low	Moderate	High	
Mild	0	0	0	0
Moderate	0	3	1	4
Severe	0	4	29	33
Total	0	7	30	37

Pain scale showed that 39% women were experiencing moderate pain and 61% had severe level of pain (Figure 1).

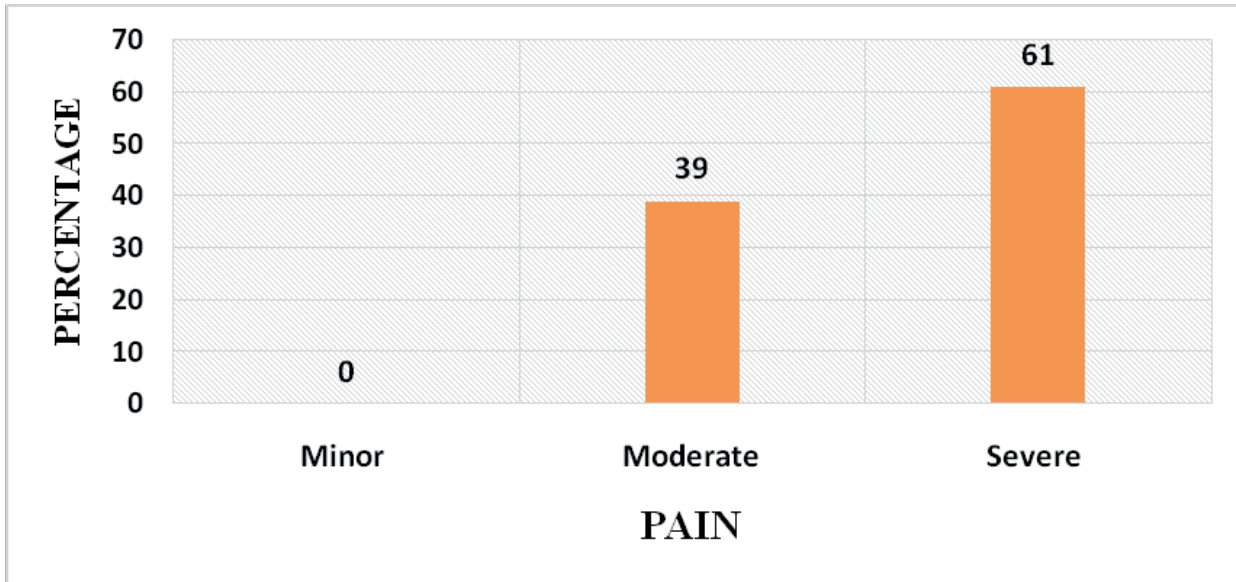


Figure 1: Bar graph showing Level of pain.

The total scoring of functional limitation showed that out of 37, 47.3% had moderate limitation and 52.7% suffered from severe functional limitation of hand (Figure 2).

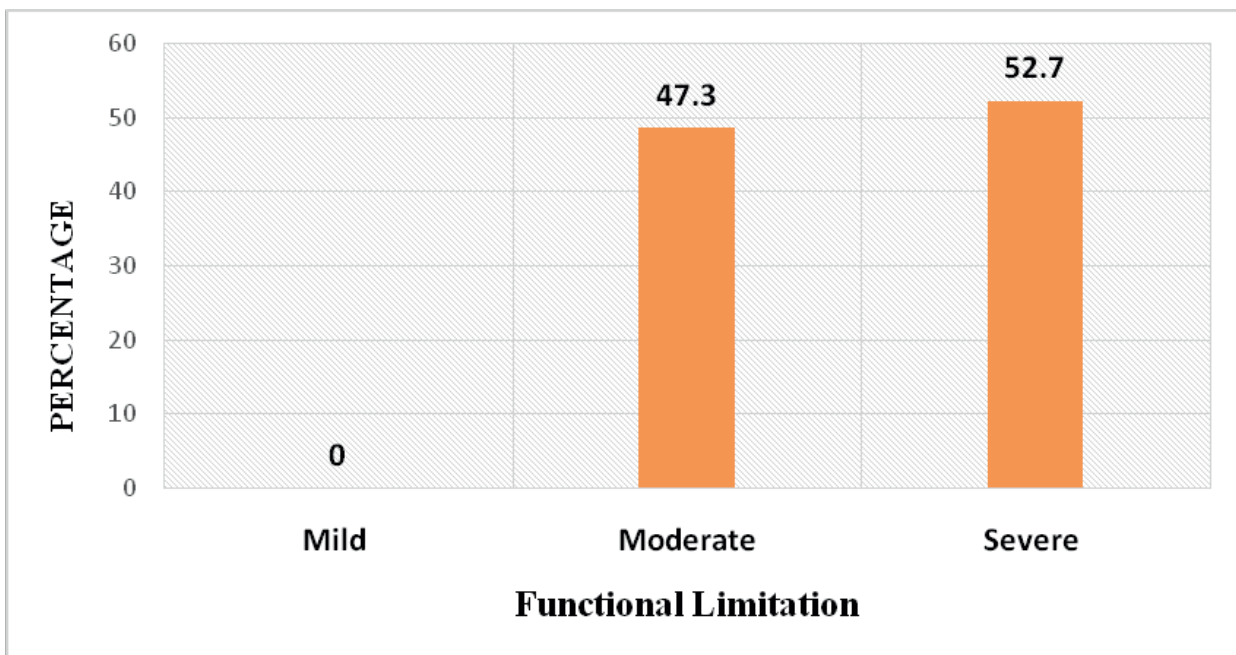


Figure 2: Total Scoring of Functional Limitation.

DISCUSSION

This study was focused to assess the physical limitations of hand function in stage II RA among adult female population. The results showed that Rheumatoid Arthritis, being amongst the most commonly occurring rheumatic disease in female population, at its second stage of course, is suspected to be a responsible for deterioration of hand function and lowering overall physical

capabilities to perform household and professional tasks, social events and recreational activities.

Although RA is a progressive disease, the disease activity may lessen sometimes during its course of remission. There is visible decrease in inflammation around the joints during this period but the functional limitations remain the same¹⁸. During the early stage of disease process, conservative measures including pharmacological interventions,

steroid injections, and splinting and wrist use modifications must be given to limit the disease progression¹⁹.

However, when the disease progress to its advanced stages and is unresponsive to conservative methods, surgical interventions have to be incorporated^{20, 21}. In order to avoid the surgical trauma physical therapy interventions at an early stage of disease are of great importance to prevent the disability, relief pain and increase functional capacity to lead a better life^{22, 23}. During the course of the disease, patients sometimes also experience symptom free periods and are able to perform their activities with ease, however fear of re occurrence prevents them from resuming their activities with full potential^{24, 25}. During this phase, the impact of disease lessens but may also relapse with adverse effects on overall function due to acute phase reactants²⁶.

Melissa Packer et al. conducted a study to associate the hand impairment and function among the cohort of patients with RA and healthy individuals. Functional ability was assessed using the Michigan Hand Questionnaire, power and pinch grip strength and the nine-hole peg test. They concluded that Grip strength, hand dexterity, and function could be condensed by up to 50% for patients with RA²⁷. Likewise, declines in grip strength, hand dexterity and function for the diseased group are greater as compared to the naturally occurring aging process only²⁸. Our study also suggested that in the severity index of hand function was highly increased in 52.7% females and moderately in 47.3% due to functional limitations caused by impairments due to RA.

This study says that a major percentage of female population, suffering from Stage II RA, experience severe pain and hindrance in performing ADLs which included usual in addition to the specific activities from daily routine. The functional limitation was maximum at this stage of disease. Khudair Z. Al-Bidri, who conducted a study in 2015 and assessed the hand impairments caused by the disease, supported it. He suggested that patients who presented with Stage II of RA were observed to have various hand deformities, which casted a great negative influences their activities of daily living thus causing functional limitations while performing various tasks²⁹.

In 2017, Belghali et al. directed a research in which they focused on the hand function in rheumatoid arthritis. The study was based on two aims; 1) to appraise the functioning of both hands in the diagnosed patients and 2) to investigate those factors, which contributed in damage to the hands. The statistical results obtained from the questionnaire showed that hands were highly affected in RA patients, which altered their

functioning and overall hand structure. The authors concluded that according to the measuring tool the hand's function, to some extent, was affected in all of the 6 domains thus lowering the excellence in life and causing hindrance in activities of daily living. Our study also concluded that quality of life was lowered due to negative impact of disease on hand function³⁰. These results prove that there is a negative impact of hand malformations on hand function. Therefore, an early and aggressive treatment plan may be necessary to prevent deformities and preserve function in Rheumatoid Arthritis patients.

CONCLUSION

The adult females' participants with stage II Rheumatoid Arthritis were found to have severely limited hand function. The functional limitations of hand were found increased with disease progression especially in adult females. However, the current study had certain limitations. The study included only female population, thus results cannot be generalized to male population. It is recommended that similar studies must be conducted in future for further knowledge of disease course and its prevention at early stages.

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CONFLICT OF INTEREST

The authors declared no conflict of interest.

ETHICS APPROVAL

The study was approved from the ethical board of Lahore College of Physical Therapy ERC-LCPT/ 450 2019.

PATIENTS CONSENT

Written informed consent was taken from each patient.

AUTHORS' CONTRIBUTION

SS presented the conception and design. MS and SS performed the collection of data. SS, MF and SS performed the analysis and interpretation of the data. MF drafted the article. MF, SS and HMA did the critical revision of the article for important intellectual content. MF conducted the statistical tests for interpretation. HMA provided the final approval and guarantor of the article.

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