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Original Article

Hand's Functional Status of Children with Rheumatoid Arthritis in Everyday Activities: A Cross-Sectional Study

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Abstract

Objective: Rheumatoid Arthritis [RA] is a chronic, systemic, autoimmune disease on an unknown aetiology. It leads to the progressive destruction of joints. It also warrants difficulties in performance of Activities of Daily Living(ADL). This study aimed at determine relationship between activities of daily living [ADL] and functional status of the hand.

Methods: This Crossectional Study was conducted at Romatology Department Children Hospital and Sheikh Zayed Hospital Lahore from June 2018 to December 2018. Convenient sampling technique helped in the collection of data. A hand function questionnaire and the Barthel Index were the contributary data collection methods. Rheumatoid Arthritis [RA] patients selected were those experiencing functional impairment in hands, having difficulty in performing ADL.

Results: The patients who were able to perform the hand function test were independent in their daily life activities. Whereas, those who were not able to perk the test were dependent on their daily life activities.

Conclusion: It was found that children with RA had a significant association between performing the ADL and functional status of hand.

Key Words: Activities of Daily Living [ADL], Rheumatoid Arthritis [RA]

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Introduction

RA is a systematic and chronic disease of inflammation of not-known aetiology, which affects joints in a symmetrical fashion causing painful swelling and deformity. Rheumatoid arthritis [RA] leads to progressive destruction of joints and difficulties in performing daily living activities. This leads to Synovial Membrane inflammation that causes highly cellular inflammatory Pannus tissue's formation. The Pannus grows over infiltrating ligaments, cartilage, and tendons, resulting in erosion of the cartilage and of the subchondral bone, along with disruption of the ligamentous insertions, and impairment of tendon glide.[1] There may be variation in its clinical presentation. It may be a mild and self-limiting arthritis or a harsh multisystem inflammation, this too with more than necessary articular manifestations. For majority of patients, hand involvement is typically present. But it causes motion limitation, deformity or weakness, stiffness in the morning, swelling, and pain. Such impairments can trigger deterioration of the hand functions and hinder ADL.

RA affects the hand in several ways. In fingers, it can cause Boutonniere deformity, Swan-neck deformity, Trigger fingers, Tendon rupture, and Opera glass hand. While in thumbs, it causes Type 1 to Type 6 thumb deformities. In Wrists, it can cause the De Quervain's Tenosynovitis and "Zigzag" deformity.[2] As for Metacarpophalangeal joint, it causes Volar subluxation and Ulnar deviation. Reduced grip strength, pain, and these deformities have a crucial impact on hand functioning and performing activities of daily living [ADL]. According to occupational therapy, Activities of daily living [ADL] are the basic tasks or

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activities that can help a person to qualify as someone who is able to maintain everyday independence. These activities are Eating, Drinking, Grooming, Bathing, Dressing, Toileting, Transferring and Mobility. Rheumatoid Arthritis [RA] affects hand functioning and leads to dependency. There are a number of factors for the impairment of the handgrip strength in a patient with RA. Because of swelling of hand, the pain, the active inflammation, the ability of the hand to apply force is affected and become dimi-nished. The Flexor Tendon Gliding may become impaired by the Wrist Tenosynovitis. Having this impairment affects the strength applied by the long flexor muscles of the fingers, significantly reducing it. And using force to grasp a thin or a narrow handle is further complicated by the loss of finger flexion owing to contractions. Pain becomes the norm and other difficulties are developed by this decreased grip strength and hand dexterity when performing activities of daily living [ADL].

Methods

This study is of cross-sectional nature. Developing or establishing a correlation between activities of daily living [ADL] and the functioning of hand is the hypothesis of this study. The hypothesis was that hand functioning and activities of daily livings [ADL] are deeply correlated. The sampling frame consisted of 59 patients. Convenience sampling technique helped in the selection of these patients. Out of 59 patients, 61% were female, while 39% were male. The inclusion criterion for the RA patients is that they must be 5 to 16 years of age. Anyone unable to fulfil this criterion will not be a participant in this study. Out of 59 patients, 42.37% of patients were in the age range 6-10 years, while the rest were in the age range 11-16 years. This study took place over a duration of 6 months, spanning from June 2018 to December 2018. Data collection done at the Department of Rheumatology Children Hospital & ICH, Lahore and Sheikh Zaid Hospital, Lahore. Collection of data is through standardised proforma; Hand Functional Index and Barthel Index. Data of Rheumatoid Arthritis [RA] patients were collected by inquiring them as per the proforma. Statistical Package for Social Sciences (SPSS) version 24 will be used for data analysis. To find the functional status of hand and its impact on daily life activities, descrip-tive analysis and chi-square test will be used. This study aims to prove that the increase in joint mobility limitation and disease activity increases the risk of functional disability.

Result

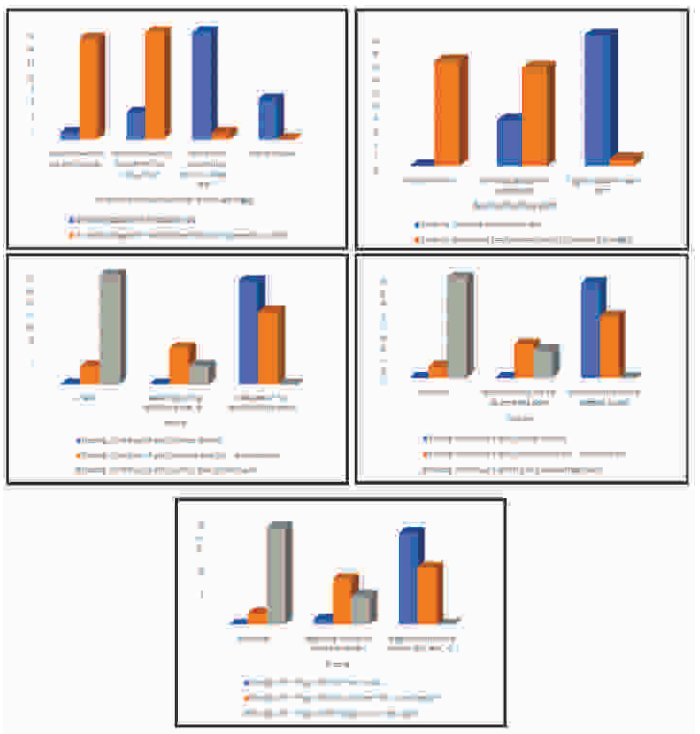
For grooming in relation with a thumb tip, 27% performed the test with no delay, with 94% (of those with no lag) being independent, whereas, of those who delayed, 34% were independent. 39% did not perform test fully and required help in grooming. For grooming in relation with 2nd finger, with no delay, 27% were independent in grooming, whereas, 37% of those who delayed were independent. However, 35% were not able to perform the test and required assistance in grooming. For feeding in connection with bending of 3rd finger, 28% of successful were self-sufficient. Whereas 35% of somewhat successful were independent, and 29% were somewhat dependent, while 14% were utterly dependent. 35% were unsuccessful, out of which 18% were unable to feed, and 3% depended on others. For usage of a toilet in connection with bending of 4th finger, 17% of the successful were self-sufficient. 32% were unsuccessful, out of which 58% were independent, 31% needed some help, and 11% utterly dependent on others. For dressing in connection with bending of 5th finger, 28% of the normally expected performed tests were self-sufficient. 34%, of those who did not fully bend their finger, were independent in dressing, whereas, 37% of those whose fingertip did not reach palm were dependent in dressing.

For grooming in relation with the antebrachium held horizontal, palmer surface pressed together point upward, 32% of the performed tests were with no delay. 18 out of 19(32%) were independent in grooming. 45%, of the performed tests, were with delay, out of which 14 were self-sufficient, whereas 13 required help. For toilet usage in relation with the antebrachium held horizontal, dorsal surfaces pressed downward, 28% of the performed tests with no delay were independent. For feeding in connection with the elbow held rectangularly: ulnar margin of hand lifted and both back of the hands placed on the table simultaneously, 28% of the performed tests with no delay were independent. 35% were unable to finish the test properly out of which 3 needed help, whereas 18 were unable to feed. For grooming concerning the radial margins of hands simultaneously placed on the table: thumbs point downward, 27% were self-sufficient. 40% had planes of hand perpendicular. 15(58%)

out of 26 (40%) were independent in grooming, whereas 11(42%) required help. For bathing concerning the radial margins of hands simultaneously placed on the table: thumbs point downward, 27% were able to perform the test and were self-sufficient. However, 28% were unable to show the hand function and they were dependent. All recorded values were less than 0.005%, showing significance. There is an association between a correlation between ADL and hand functioning.

Moreover, it had affirmed that the Occupational Therapy Motor had the following roles:

1. Maintaining or increasing the range of motion and mobility of joints.
2. Maintaining or increasing the strength of muscle.
3. Maintain or improve endurance.
4. Maintain or improve functional ability.
5. Prevent or correct joint deformity, make and keep the patient personally independent.
6. Consider a splint to prevent ulnar deviation deformity of the hand and the wrist.
7. Consider splints to maintain wrist extension of the hand.



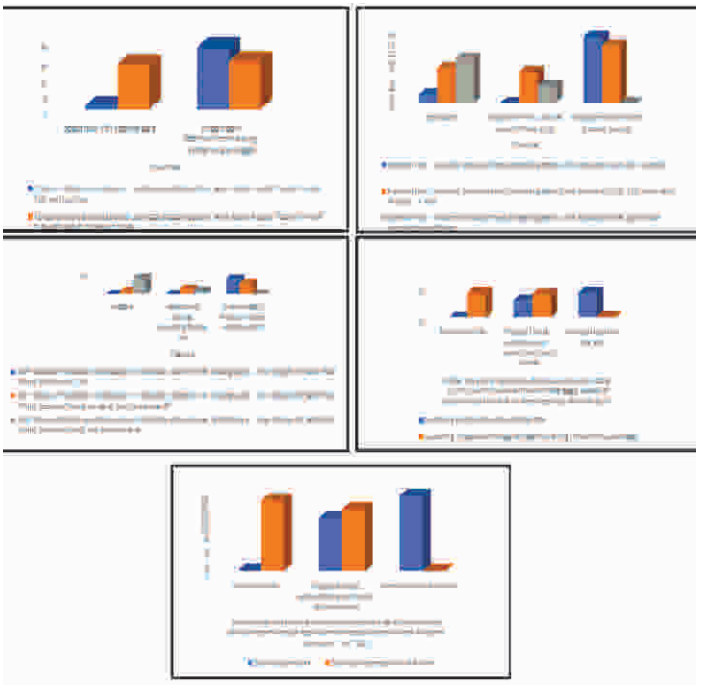


Table 1:

Inferential Analysis				
	5th finger	Chi-Square	df	P-value
Grooming	2nd finger	38.538	3	0
Grooming	3rd finger	35.934	2	0
Feeding	4th finger	48.136	4	0
Toilet use	5th finger	48.411	4	0
Dressing	Forearm	46.454	4	0
Grooming		28.025	2	0
Toilet use	Lift ulnar margin	25.631	4	0
Feeding	Radial margin	48.136	4	0
Grooming		39.261	4	0
Bathing		29.64	2	0

Discussion

Rheumatoid Arthritis, commonly abbreviated as RA, is a systemic and chronic autoimmune illness of not-known aetiology, and also chronic, that leads to the destruction of joints progressively, affecting joints in a symmetrical fashion causing painful swelling and deformity. It also hinders the performance of ADL. It causes inflammation of the Synovial Membrane, which leads to the formation of highly cellular inflammatory pannus tissue. Developing or establishing a correlation between ADL and hand functioning for patients with RA is the aim of this study. Bjelle conducted research spanning a period of five years. His research was about the capacity of activists of daily living [ADL] and how it related to the functioning of the hand for patients with Rheumatoid Arthritis [RA].[3] In this study, the number of patients included was 43, out of which 28 were males, whereas there

were 15 females, and the mean age of all participants was 53.7 years. 7.5 years was the calculates duration for which the patients have had the disease. Many factors, that were measured, contributed to the results. These were the K-function Test [KFT], the Grip Ability Test [GAT], self-estimated hand function, the Health Assessment Questionnaire [HAQ], grip strength, and pain scales. The results of three Health Assessment Questionnaire [HAQ] components, the Grip Ability Test [GAT], and the K-function Test [KFT] were quite significantly worse for female patients, as compared to male patients. So, in our research, the number of females was higher as compared to males.

Palmar et al. conducted a study to investigate the handgrip strength and its relation with hand dexterity in patients with Rheumatoid Arthritis [RA].[4] The participants were 32 women of 18 - 70 years. Using the Handgrip strength, pinch strength, the Purdue Pegboard test, this study focused on patients with RA in order to determine clinical relevance, if any, of rapid disabilities of hand, shoulder, or arm and dexterity of hand, and as to how they are interrelated to each other. This study concluded that strengthsof handgrip was related to disability and activity of disease in RA patients. Erol Am et al. studied Rheumatoid Arthritis [RA] and how it affects the functional status of hand.[1] There were a total of 38 patients and 33 controls in this study. Purdue Pegboard Test [PPT] helped in assessing coordination and dexterity. The Duruoz Hand Index [DHI] helped in assessing hand disability. This study concluded that Rheumatoid Arthritis [RA] had a negative impact on hand function. Gizemirem Kinikli et al. studied functional disability of upper extremity and strength of grip of patients with RA.[5] The study consisted of 29 patients and used The Duruoz Hand Index [DHI] for assessing hand disability. Stanford Health Assessment Questionnaire [SHAQ] was used for measuring physical disability. The study concluded that strength of lower handgrip and its endurance were related to functional disability of upper extremity in RA patients. The validity of the hand QUICKDASH questionnaire and the disabilities of the arm and shoulder were researched by Kensuke Ochi et al. They employed patients with Rheumatoid Arthritis having functional impairment for this study. This study consisted of 94 patients.[6] The result showed that QUICKDASH, for evaluating impairment of upper extremity, index of disability and control of disease in a large cohort of RA patients was suitable. Some researchers researched the relation between the handgrip, pinch strength and activity of disease (impairment of functions in patients with RA). Dynamometer helped in assessing handgrip. Analysis of these relations was done with the help of the Signals of Functional Impairment [SOFI], the Health Assessment Questionnaire [HAQ], and the Durouz Hand Index [DHI]. A negative correlation between activity of the disease, includes impairment of functions, disability and the duration of the disease, and strength of handgrip and strength of pinch of patients with Rheumatoid Arthritis [RA]. Kenrir, Nampei et al. studied the association between pinch strength and hand dysfunction, finger deformities, and contact points.[7] Eighty-four hands of forty-two patients with Rheumatoid Arthritis [RA] were evaluated by them. They determined functional status using the Hand Disability Index [HDI] and found a correlation between pinch strengths and hand disability. Rheumatoid Arthritis [RA] patients' disability of arm and shoulder [DAS] was researched by Aktekin LA et al.[8] This study comprised of 166 patients. Hand questionnaire, Health Assessment Questionnaire [HAQ], and DASH helped in assessing the relationship with activity of disease. DASH score was statistically high with increased activity of the disease. DASH and HAQ displayed a correlation (r0.883). In order to research or study the relationship between the disease activity and the hand functioning of patients with Rheumatoid Arthritis [RA], the short-form score for the assessment and quantification of chronic rheumatoid affections of the hands, or SF-SACRAH, was employed by Singh H et al.[9] There were 100 patients included in the study. It was discovered in the study that, as per the assessment of DAS-28 scores, the activity of disease for patients with RA had a weak correlation with hand functions. This was especially true for the remission states and the low activity of the disease. The hand functions were assessed as per the M-SACRAH and the SF-SACRAH, and both were quite significantly correlated. Therefore, assessing of Rheumatoid Arthritis [RA] patients by SF-SACRAH was suggested. A study on grip strength, activities of daily living [ADL], hand functioning, and some essential assistive devices was published by Shipham & Pitout.[10] They concluded that the loss of strength of the grip is the principal pointer for assistive devices. The usage of assistive

instruements increased and Activities of Daily Living (ADL) became more difficult as the grip became weak. Their result showed the highest correlation between grip strength and Activities of Daily Living (ADL). Our study had revealed similar results for Rheumatoid Arthritis (RA) patients. We also observed a very high correlation between hand functioning and Activities of Daily Living (ADL). Carol A. Kennedy et al. conducted a study on properties of the measurement of the QUICKDASH (Disabilities of the Arm, Shoulder and Hand), measure of outcome and adaption of cross-cultural QUICKDASH.[11] An acceptable performance b=of the toll was observed in this study. This was backed by strong evidence of validity and reliability through hypothesis testing. For structural validity testing, there was also moderate and positive evidence. Mathilda A Björk et al. conducted a study on hand function and activity limitation in rheumatoid arthritis.[12] Signals of Functional Impairment [SOFI] and the Grip Ability Test [GAT] helped assess the hand function. Grippit helped in the measurement of grip force. The Swedish version of the Health Assessment Questionnaire [HAQ] helped assess activity limitation. As compared with healthy referents, GAT, grip force, SOFI-hand, and HAQ were significantly different for the patients of both sexes throughout the study. In Rheumatoid Arthritis [RA] patients, HAQ had a link with grip force, whereas in healthy referents, it had a link with age and GAT. López López CO1 et al. conducted a study on Hand function in rheumatic diseases.[13] Their study included 40 patients (72% women and mean age of 49.25 ± 14.2 years) and used m-SACRAH and the Health Assessment Questionnaire Disability Index [HAQ-DI]. Although there was only a correlation with limited motion joints, a good correlation was discovered for a patients' perspective variables. For the limited motion joint, the value for "r" was equal to 0.41 and "P" was less than 0.05 in M-SACRAH, whereas in HAQ-DI merit of "r" equalled 0.03 and for "P" was less than 0.05. For patients' perspective variables, the merit of "r" equalled 0.43 and for "P" was less than 0.05 for both M-SARAH and HAQ-DI. In our study, the result showed that patients with Rheumatoid Arthritis (RA) had a good relationship between hand function and activities of daily living (hand function / Barthel: $P<0.05$). In order to prevent harsh or severe deformities, finger flexor muscles' and wrist's strengthening exercises were crucial, as per the study of Stephanie Robinson Cima et al.[14] Some of the functions lost owing to the progression of the disease were also re-established with the help of these exercises.

Conclusion

This study aimed to reveal how patients with Rheumatoid Arthritis (RA), with an object quality of life, suffered from a functional disability. The data were collected only from 2 institutes and comprised of only fifty nine patients. As these were minors, their caregivers were present or interviewed on their behalf. Some caregivers were quite non-cooperative. However, these results suggest that the certified caregiver should also be attentive towards the grip strength of the patients, as well as to measure the mobility of their joint, in order to develop or create such strategies that can improve the physical functioning of patients with Rheumatoid Arthritis (AR). However an observation made was that the function of hand and difficulty in ADL, correlated in Rheumatoid Arthritis (RA) patients with less hand function indication more struggle in daily life activities.

Conflict of Interest: None

References

1. Effect of rheumatoid arthritis on strength, dexterity, coordination and functional status of the hand: the relationship with magnetic resonance imaging findings - PubMed [Internet]. [cited 2021 Jan 14]. Available from: https:// pubmed.ncbi.nlm.nih.gov/27926913/
2. Cima SR, Barone A, Porto JM, de Abreu DCC. Strengthening exercises to improve hand strength and functionality in rheumatoid arthritis with hand deformities: A randomized, controlled trial. Rheumatology International [Internet]. 2013 Mar [cited 2021 Jan14];33(3):725–32. Available from: https:// pubmed.ncbi.nlm.nih.gov/22565655/
3. Mottern G. The Effectiveness of Static Hand and Wrist Splints for People with Rheumatoid Arthritis: A Systematic Literature Review [Internet]. 2013 [cited 2021 Feb 9]. Available from: https://www.op.ac.nz/assets/OPRES/dee73bc858/Mottern-Effectiveness-of-static-hand-and-wrist-splints-2013.pdf
4. Palamar D, Er G, Terlemez R, Ustun I, Can G, Saridogan M. Disease activity, handgrip strengths, and hand dexterity in patients with rheumatoid arthritis. Clinical Rheumatology [Internet]. 2017 Oct 1 [cited 2021 Feb 9];36(10):2201–8. Available from: https:// pubmed.ncbi.nlm.nih.gov/28721628/

5. Kinikli Gİ, Şahin A, Güney H, Yüksel İ, Kinikli G. EXERCISE THERAPY AND REHABILITATION Investigation of grip strength and upper extremity functional disability in patients with rheumatoid arthritis [Internet]. Vol. 3, Journal of Exercise Therapy and Rehabilitation. 2016 [cited 2021 Feb 9]. Available from: www.jetr.org.trJOURNALOF
6. Ishida O, Furuya T, Inoue E, Ochi K, Ikari K, Taniguchi A, et al. Risk factors for established vertebral fractures in Japanese patients with rheumatoid arthritis: Results from a large prospective observational cohort study. Modern Rheumatology [Internet]. 2015 [cited 2021 Feb 9];25(3):373–8. Available from: https://www.tandfonline.com/doi/abs/10.3109/14397595.2015.1004276
7. Association of pinch strength with hand dysfunction, finger deformities and contact points in patients with rheumatoid arthritis - PubMed [Internet]. [cited 2021 Feb 9]. Available from: https://pubmed.ncbi. nlm. nih. gov/22132810/
8. Aktekin LA, Eser F, Başkan BM, Sivas F, Malhan S, Öksüz E, et al. Disability of Arm Shoulder and Hand Questionnaire in rheumatoid arthritis patients: Relationship with disease activity, HAQ, SF-36. Rheumatology International [Internet]. 2011 Jun [cited 2021 Feb 9];31(6):823–6. Available from: https:// pubmed.ncbi.nlm.nih.gov/20680284/
9. Singh H, Kumar S, Talapatra P, Gupta V, Ray S, Kumar H. Assessment of hand functions in rheumatoid arthritis using SF-SACRAH (short form score for the assessment and quantification of chronic rheumatoid affections of the hands) and its correlation to disease activity. Rheumatology International [Internet]. 2012 Nov [cited 2021 Feb 9];32(11):3413–9. Available from: https://pubmed.ncbi.nlm.nih.gov/22057144/
10. Shipham I, Pitout SJ. Rheumatoid arthritis: hand function, activities of daily living, grip strength and essential assistive devices. Curationis [Internet]. 2003 [cited 2021 Feb 9];26(3):98–106. Available from: https://pubmed.ncbi.nlm.nih.gov/15027271/
11. Kennedy CA, Beaton DE, Smith P, van Eerd D, Tang K, Inrig T, et al. Measurement properties of the Quick DASH (Disabilities of the Arm, Shoulder and Hand) outcome measure and crosscultural adaptations of the QuickDASH: A systematic review [Internet]. Vol. 22, Quality of Life Research. Qual Life Res; 2013 [cited 2021 Feb 10]. p. 2509–47. Available from: https://pubmed. ncbi.nlm.nih.gov/23479209/
12. MA. Björk, ISM. Thyberg, T. Skogh BUCG. Hand function and activity limitation according to health assessment questionnaire in patients with rheumatoid arthritis and healthy referents: 5-year followup of predictors of activity limitation (The Swedish TIRA Project) - PubMed [Internet]. [cited 2021 Feb 10]. Available from: https://pubmed.ncbi.nlm.nih.gov/17299837/
13. López López CO, Alvarez-Hernández E, Medrano Ramirez G, Montes Castillo ML, Hernández-Díaz C, Ventura Rios L, et al. Hand function in rheumatic diseases: Patient and physician evaluations. International Journal of Rheumatic Diseases [Internet]. 2014 Nov 1 [cited 2021 Feb 10];17(8):856–62. Available from: https://pubmed.ncbi.nlm.nih.gov/25294371/
14. Cima SR, Barone A, Porto JM, de Abreu DCC. Strengthening exercises to improve hand strength and functionality in rheumatoid arthritis with hand deformities: A randomized, controlled trial. Rheumatology International. 2013 Mar; 33(3): 725–3 2.

Authors Contribution

IAH: Conceptionlization of Project, Writing of Manuscript
HF: Data Collection
IAH, HF: Literature Search
AAW: Statistical Analysis, Drafting, Revision
RA, TN, FS: Drafting, Revision