ISSN: 2278-2648

***International Journal of Research in Pharmacology & Pharmacotherapeutics (IJRPP)***

***IJRPP |Vol.14 | Issue 2 | Apr - Jun -2025***

**www.ijrpp.com**

DOI : https://doi.org/10.61096/ijrpp.v14.iss2.2025.330-335

**Review**

# A Review Of Literature On The Jamar Hydraulic Hand Grip Dynamometer In Patients With Rheumatoid Arthritis

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Published on: 03 May 2025

Published by:
DrSriram Publications



## Abstract

**Background:** Rheumatoid arthritis (RA) is a chronic autoimmune disease that reduces hand grip strength, affecting daily functions. The Jamar Hydraulic Hand Grip Dynamometer is commonly used to assess grip strength in RA patients, but factors like joint deformities and pain may influence measurement accuracy. This review examines its use in evaluating RA patients.
**Methods:** The review of this studies from PubMed, Google Scholar, and Scopus was conducted, focusing on RA patients who underwent grip strength testing with the Jamar dynamometer. Studies were assessed for design, sample size, patient demographics, and outcomes related to grip strength, disease severity, and functional impairment.
**Results:** Studies show that RA patients have significantly reduced grip strength, correlating with disease activity and disability. The Jamar dynamometer is reliable and valid, providing consistent results, though pain and joint deformities can affect measurements.
**Conclusion:** The Jamar Hydraulic Hand Grip Dynamometer is an effective tool for assessing grip strength in RA patients. It helps monitor disease progression and treatment effectiveness, though future research should focus on standardizing protocols and addressing measurement variability.

**Keywords:** Rheumatoid arthritis, Jamar Hydraulic Hand Grip Dynamometer, Grip strength.

## INTRODUCTION

Rheumatiod arthritis is a chonric autoimmune disorder it leads to the Damage of Joint, inflammation of synovial joint it leads to Pain and disability. The prevalence of RA with the higher rate in western and northern part and it included the other regions of the European decent along with europe and north america, the rheumatoid

arthritis mostly seen in female (3.6%) compared to the males (1.7%) along with the age of 60 to 80 years are more common. (Krati Chauhan et al 2025)(1).

The etiology of RA is a invoules between the genetic predisposition and environment factors the The enviorment factors are trigger like smoking have highly risk of RA with who have a Anti citrullinated antibodies (ACPA) Postive and genetic factors Plays a Major rolee in RA., The studies shows HLA-DRBI Particullary contains "shared epitope " are more significant increase in RA , the gentic Predominantion along with other genes in poly morphisms are PTPN 22 and STAT 4 are also implications (du Teil Espina M et al 2019) (2).

clinically it represents as symmetrical joint movement mostly it is effected small joints and feet .The symptoms are the non- specific mostly we see the Pain, stiffness at the moring, fatigue and joint swelling, tenderness the deformity become more prominent (Reem H. Mohammed et al 2025)(3)

The pathophysiology of the rheumatoid arthritis is the results of destruction of the cartilage and bone within the joint due to the autoimmune attack on the synovium it leads to the synovial hyperplasia and pannus formation of the joint due to the infiltration of the immune cells that cause the inflammatory milieus it included the T- cells and B- cells and the production of pro- inflammatory cytokines such as tumor necrosis factor - alpha and interleukin -6 ( IL- 6) ( Mohd Jahid et al 2023) (4).

Patients with insufficient treated the RA can lead to the Extra articular manifestation of the rheumatoid factor can lead to the Damage of the organ systems in the body it included the vasculitis, cardiovascular risk and lung disease ( Prof Joseph S Smolen MD et al 2016)(5).

In rheumatoid arthritis condition of the hand commonly sees the hand grip and pinch grip will reduce due to the muscle atrophy and pain along with stiffness, it leads the difficulty in eating, writing, dressing and holding objects. In rheumatoid arthritis condition we see the deformities of the hand ( Bircan Ç et al 2014 )(6).

In hand the forearm have 35 muscles it help for grip strength and the forearm extensors muscle help for hand and wrist, the hand contains four major muscles and a The hand contains four major joints and a combination of extrinsic and intrinsic muscles, including the flexor carpi radialis, flexor pollicis longus, and abductor pollicis brevis, all of which are involved in gripping. Hand strength can be significantly affected by injury or disease, making grip strength measurement critical for monitoring disease progression and rehabilitation in conditions like RA. (Scott F.M. Duncan et al 2013). (7).

The Jamar Hydraulic Hand Grip Dynamometer is a widely used and reisahle too for measuring grip strength in clinical settings. This device is considered the gold standard for hand strength assesament due to its accuracy and reproducibility The Jamar dynamometer functions by measuring the force exerted by an individual's hand as they squeeze the handle it has adjustable settings, allowing it to accommodate a variety of hand grip, the hand grip can do different positions like supine position or sitting position This device provides objective measurements of grip strength, which are essential for trucking the progression of diseases like RA ( S. Cildan Uysal et al 2022)(8).

In the context of rheumatoid arthritis, the Jamar Hydraulic Hand Grip Dynamometer plays an essential role in assessing the impact of the disease on hand function. The measurement of grip strength provides clinicians with valuable data to track the severity of disease progression and evaluate the effectiveness of treatment modalities. For instance, interventions such as medication, physical therapy, or surgical procedures can be assessed for their impact on grip strength and hand function (Loppenthin et al 2015)(9)

The Jamar Hydraulic Hand Grip Dynamometer is a widely used tool for assessing hand function in patients with rheumatoid arthritis (RA). It serves as a reliable instrument for measuring grip strength, a key indicator of muscle function and joint integrity. This review examines the literature on the Jamar dynamometer's role in gauging grip strength, focusing on its reliability, validity, and significance in clinical practice and research. By analyzing the current understanding, we aim to highlight how this device aids in the management and monitoring of Rand its potential to improve patient outcomes through early detection and intervention.(Elise Yee Yan Li et al 2023)(10).

| S,no | Author | Published year | Conclusion |
|---|---|---|---|
| 1 | Sumru Savas [10] | 2023 | A comparative study was conducted to assess grip strength (GS) measurements using three dynamometers: the Jamar hydraulic (Jamar), Jamar PLUS+ Digital (Jamar+), and the spring-type Takei T.KK. 5401 (Takei). The study included 110 outpatients aged 60 and over. The aim was to compare Jamar as the reference standard against Jamar+ and Takei. Results showed that both Jamar+ and Takei dynamometers were reliable and valid in measuring GS compared to the Jamar dynamometer. However, both overestimated GS relative to the Jamar dynamometer. |

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| 2 | Alison Lupton-Smith [11] | 2022 | A cross-sectional observational study with a randomized single-blind twas conducted on consenting adult patients admitted to general hospital wards. The best of three measurements taken using the dominant hand was used for analysis and concluded that The Camry digital hand grip dynamometer and jamar hydraulic handgrip dynamometer. But Jamar hydraulic handgrip dynamometer is less expensive but not validate the hospital settings and Camry digital hand grip dynamometer are valid tool assess the hand grip in hospital settings |
| 3 | Li Huang [12] | 2022 | A cross-sectional study with a random crossover design assessed the reliability and validity of the CAMRY EH101 and JAMAR DYNAMOMETERS in 1,064 healthy adults aged 50-90 years. The Jamar dynamometer served as the reference device. Testing order was randomized with a 10-minute gap between devices. Intraclass correlation coefficients (ICCs) and Bland-Altman analysis were used to evaluate reliability and validity. The study concluded that the CAMRY EH101 dynamometer demonstrated excellent reliability and validity, making it a reliable, cost-effective tool for assessing grip strength in geriatric clinical practice. |
| 4 | Elif Gur Kabul [13] | 2022 | A study on the effect of rheumatoid arthritis (RA) on upper extremity function involved 24 women (12 healthy, 12 with RA). Evaluations included a JAMAR dynamometer, Health Assessment Questionnaire, and 3D kinematic analysis during a "jar opening motion." The analysis measured time (Part 1 + Part 2), shoulder-to-table distance, elbow flexion, wrist extension, and angular rotation of the arm, forearm, and hand. The results showed that compared to healthy individuals, those with RA had slower motion, increased elbow flexion, reduced hand grip strength, and altered hand movement patterns. Greater disability in RA may lead to increased load on elbow flexion. |
| 5 | Lygia Paccini Lustosa [14] | 2020 | A cross-sectional study assessed the concurrent validity of handgrip strength (HGS) measurements using the Jamar and bulb dynamometers in women with rheumatoid arthritis (RA). Forty-four RA patients and 69 healthy adults performed three maximum repetitions with each hand on both instruments. Reliability was evaluated using ICCs, and differences between the two dynamometers were analyzed with repeated t-tests. The study concluded that RA compromises hand function, leading to a decrease in handgrip strength. |
| 6 | Fisioter. Pesqui.[15] | 2019 | Cross sectional study conducted on a study Handgrip strength and functional performance in middle-aged and older women with rheumatoid arthritis method This was a controlled clinical trial, with assessments in three moments (0, 10 and 18 weeks) At the home, from October 2015 to November 2017. Fifty-two patients (30 women and 22 men) participated in the study. conclusion older women were in better muscle conditions. Parameters indicated as markers of functional and muscle performance in elderly women were shown to be associated, confirming the use of these markers in this specific condition. |
| 7 | Graziela Sferra da Silva [16] | 2018 | A cross-sectional case-control study on hand strength in RA patients found that grip and pinch strength, measured with Jamar® and pinch gauge dynamometers, correlate strongly with functional capacity but not with disease activity. Disease activity was assessed using the DAS-28, while functional capacity was evaluated through the HAQ, CHFS, and DASH questionnaires. The study showed that decreased hand strength is a strong indicator of functional disability in RA patients. |
| 8 | Mustafa Can Kilic [17] | 2018 | An experimental study on the relationship between hand function and activity performance in 40 RA patients (mean age: 50.7±9.9 years) measured pain severity, hand grip strength with a dynamometer, and pinch strengths with a pinch meter. Hand function was assessed using the Nine-Hole Peg Test, Michigan Hand Outcome Measure, and the Canada Occupational Performance Measure (COPM) for daily activity performance. The study suggests that teaching pain management and |

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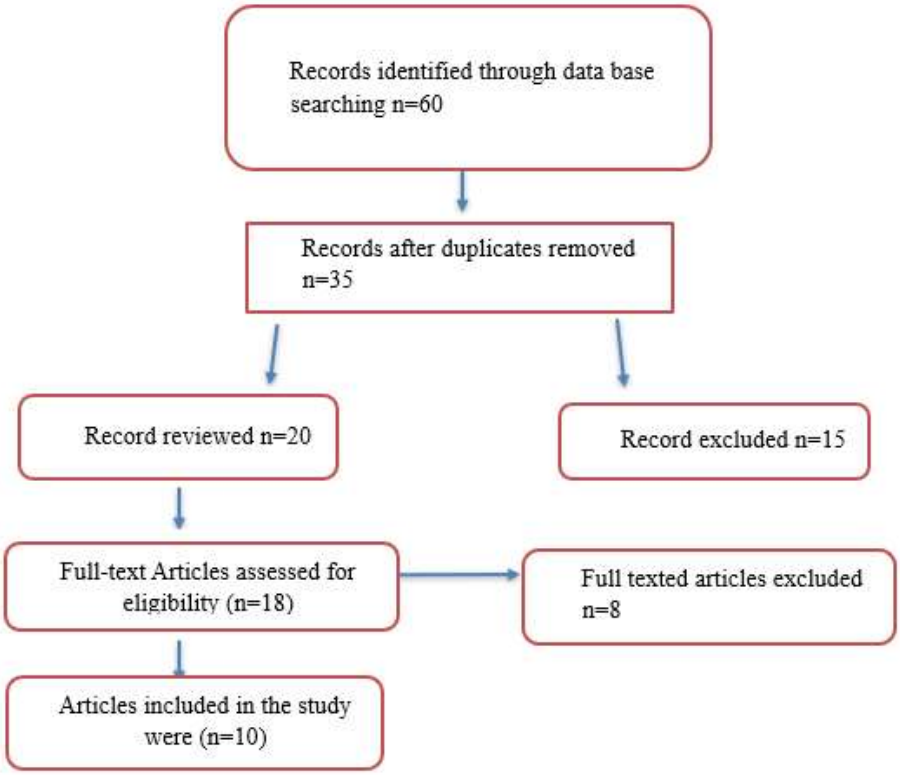
| | | | hand protection strategies can improve participation in daily activities and enhance independence for RA patients. |
| 9 | Susie C Higgins [18] | 2018 | Review study conducted on a study Measuring hand grip strength in rheumatoid arthritis This review examines the use of hand grip strength measurements in assessing RA, noting that disease activity scores may not fully reflect the regional impact on the hands. It explores what hand grip strength indicates, how it is measured, challenges in testing, and its clinical applications. |
| 10 | D.Palamar[19] | 2017 | A prospective trial conducted on a study of Disease activity, handgrip strengths, and hand dexterity in patients with rheumatoid arthritis A prospective trial involving 82 women with RA found that handgrip strength correlates with disability and disease activity. The study recommends using the QuickDASH questionnaire for functional outcomes and handgrip strength to assess RA severity, hand disability, and dexterity, even in patients with low disease activity. |

## METHODOLOGY

The evidence was gathered from online web publications obtained from different search engines, including Google Scholar, PubMed, and other obesity journals. A tailored search was conducted using a review of the literature on the Jamar hydraulic hand grip dynamometer in patients with rheumatoid arthritis. The period was designated as 2015 to 2023 to gather precise and current facts from throughout the globe over the past decade. We have identified a total of 10articles that meet our specific criteria for inclusion and exclusion. All 10 publications were obtained in their entirety to be analyzed and continued with further analysis. The results are derived using a systematic approach from all articles and displayed in a tabular format for enhanced comprehension. The selection techniques are detailed in the PRISMA

**FLOW CHART**



## DISCUSSIONS

In rheumatoid arthritis condition that significantly affect hand function, primary it effects the grip strength and pinch strength. Grip Strength consider as crucial for daily living activities, these measurements are important it's directly related to function capabilities of hand in RA. Patients who have deformities like ulnar deformity and z deformity have a lesser hand grip strength compared to nondeformity patients. The structural changes and limits the function capabilities. The Jamar hydraulic hand grip dynamometer used as a assessment tool for monitoring the disease severity. (Yildiz N et al 2018)(21).

The jamar hydraulic hand grip dynamometer is a widely used for measuring maximal isometric grip and strength, it can acceptable both in clinical and research facilities. In RA patients we can use as a diagnostic and treatment approach it can help to know disease progression and functional impairment of the hand (Salaffi et al. 2021) (22).

For individuals who are considered risk for early development of RA, the study found out the strength grip measured by dynamometer is was reduced 70% compared to normal individual this suggests hand functional impairment preceds the clinical onset of RA(van Steenbergen HW et al 2023)(23).

Using jamar hydraulic hand grip dynamometer have identified significant inconsistency accross studies concerning measurement parameters, they have lack standard protocol which can impade the comparability and reproducibility of the results. (Shiratori AP et al 2014)(24).

However, several challenges to accurate measurement using the Jamar dynamometer exist in RA patients. Joint deformities, pain, and fatigue can significantly affect grip strength and, consequently, the reliability of the results. A study by Ibrahim et al. (2017)(25).

While the Jamar dynamometer remains the valuable tool for assessing, diagnostic and monitoring tool it is used for a RA should be complemented by clinical judgement and consideration of patient - specific factors to ensure accurate functional assessment status and disease progression.

## CONCLUSION

The Jamar Hydraulic Hand Grip Dynamometer is an effective and reliable tool for assessing grip strength in RA patients. It offers valuable insights into disease severity, functional impairment, and treatment outcomes. However, the tool's effectiveness may be influenced by factors such as joint deformities, pain, and patient fatigue. To enhance the clinical applicability of the dynamometer, future research should focus on developing standardized protocols that account for these challenges. Additionally, exploring the integration of grip strength measures with other clinical indicators can improve the overall management of RA.

### RECOMMENDATIONS

Future research should explore the dynamometer's role in predicting long-term outcomes and functional decline. Studies could compare grip strength across populations or integrate it with other physical function measures. Expanding its clinical use for early detection of disease progression could further improve the quality of life for RA patients.

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