Review Article

The Role of Physiotherapy in Chikungunya: A Comprehensive Analysis

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Abstract

Chikungunya fever (CHIKV) is a viral infection transmitted primarily by Aedes aegypti and Aedes albopictus mosquitoes. While the benefits of physiotherapy in managing musculoskeletal disorders are well-established, its role in post-chikungunya arthralgia remains underexplored. This review aims to evaluate the effectiveness of diverse physio therapeutic interventions and analyse their outcomes over varying timeframes. A thorough literature search was performed using databases such as PubMed and Google Scholar. The findings highlight that interventions like electrotherapy, kinesiotherapy, and manual therapy effectively alleviate pain, improve functional capacity, and enhance range of motion (ROM) in individuals with musculoskeletal issues. Evidence suggests that well-structured therapeutic protocols significantly reduce pain, restore ROM, and improve functional performance. Additionally, the frequency and timing of these interventions appear to influence their therapeutic efficacy, offering valuable guidance for patients and healthcare practitioners alike.

Keywords: Chikungunya, arthralgia, physiotherapy, physiotherapy management post chikungunya arthralgia.

Introduction

Chikungunya fever is a viral disease caused by the chikungunya virus (CHIKV), transmitted by the bite of infected Aedes aegypti and Aedes albopictus mosquitoes [1].

The term "chikungunya" originates from the Makonde language, spoken in various of eastern Africa, and translates to "one who bends over." This refers to the bent parts posture that patients often adopt due to severe joint pain during the illness. [2]

It has become a global concern and has been designated as a priority by the scientific leadership group of the Global Virus Network.[3] In India, approximately 15% of clinically suspected cases are confirmed, with a recent study from 2019 reporting a laboratory confirmation rate of 14.9% among suspected cases. Globally, determining an exact percentage remains challenging due to variations in reporting practices.[10]

Symptomatic infection from the virus is typically characterized by a sudden high fever, often exceeding 39 °C, along with headache, chills, conjunctivitis, rash, muscle pain, and severe symptoms. Clinical presentations of chikungunya may vary in different geographical regions around the world. In some regions, an incidence as high as 80% has also been reported.[5] In the post-viral or chronic phase, joint pain becomes a predominant symptom.[6] Chikungunya is characterised by a high morbidity rate, primarily due

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to severe and prolonged joint pain. This significantly reduces both quality of life and productivity.[7]

In this context, physical rehabilitation is essential for maintaining functionality in patients during the chronic phase of the disease. It aids in cellular healing processes, enhances joint lubrication, and restores normal joint mechanics by preventing tissue adhesions. Physiotherapy has an added advantage as it is a drug-free alternative for managing pain related to joints, tendons, and nerves. [8]

Although the clinical benefits of physiotherapy are well-documented, its impact on post chikungunya arthralgia remains underexplored. To address this gap, the present article systematically reviews the effectiveness of various physiotherapeutic interventions, emphasizing their outcomes at different time intervals. By correlating the frequency and timing of interventions with their therapeutic results, this study aims to provide valuable insights into optimizing physiotherapy for managing post-chikungunya arthralgia.

Materials and Methods

A comprehensive search for studies was conducted using the Google and PubMed electronic databases. The following keywords were used: "Chikungunya, treatment, arthralgia, physiotherapy treatment, post-Chikungunya treatment," as available in MeSH (Medical Subjects Headings) terms. The inclusion criteria for study selection were Quasi-experimental, case reports, peer-reviewed articles, and randomized controlled trials (RCTs). Exclusion criteria included consensus statements from medical societies, expert opinions, and articles with restricted access.

Initially, a total of 200 articles were found. After removing duplicates, 68 articles remained. Applying the exclusion criteria reduced this number to 25. Of these, 10 articles with full PDFs were thoroughly reviewed, and ultimately, 9 articles were selected for the final review. Titles and abstracts of all identified articles were reviewed, with no restrictions on population groups. In cases where reading the abstract alone was insufficient to determine eligibility based on the inclusion criteria, the full text of the article was reviewed to make a final decision on inclusion.

The data extracted from various articles were categorized based on the duration of the intervention (e.g., 2 weeks, 3 weeks, 4 weeks, and 12 weeks). Additionally, the physiotherapy techniques applied to different joints and their outcomes at various time intervals were systematically tabulated and analyzed (Table 1).

Limitations

The patients of varying ages, genders, and health backgrounds. For instance, some patients were older adults with pre-existing conditions, while others were younger and generally healthy. this diversity might affect responses to exercise, and our review did not account for pre-existing health status or age, which limits our findings., hence the data cannot be directly extrapolated and should be used with caution.

Result

2 weeks

Two studies conducted by Tenorio et al., (2020)[11] and Almeida et al., (2021)[12] utilized electro thermotherapy, kinesiotherapy and manual therapy for chikungunya patients at a rate of one session per week for 14 and 10 sessions respectively. Both studies showed a reduction in pain. They also reported improvements in functional capacity and range of motion (ROM). In a case report by Ribeiro et al., 2016[13] the electrotherapy combination including ultrasound, infrared laser and Tens burst were given 10 sessions of similar outcome came there the study showed an improvement in quality of life is seen after intervention and also functional activity increased.

In case of Silva et al., 2020[14] the effect was traced even in molecular level where 12 training sessions of 40 minutes of physiotherapy. Maximum shows improvement of lipid peroxidation, protein oxidation and non-enzymatic antioxidant system.

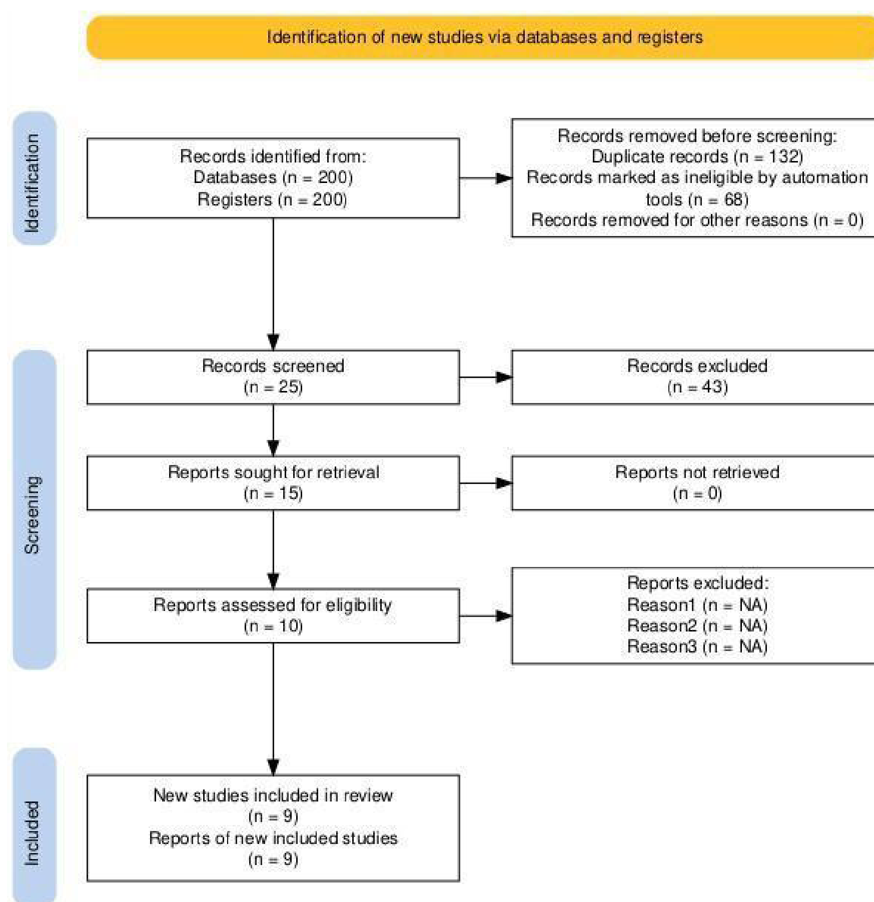

Figure 1: Prism flowchart for a comprehensive analysis

From the above studies, it is seen that there is an effect of physiotherapy even with a 2week intervention. Collectively, these findings underscore the importance of integrating physiotherapy into chikungunya management protocols to optimize patient recovery, enhance functional outcomes, and improve overall quality of life.

3 weeks

The study by Rahman et al.,2017[3] involved a group of patients with post-chikungunya joint pain. Three patients experienced lower back and knee pain, three patients had pain in the lower back and ankle, and four patients reported neck and shoulder pain. A treatment of electrotherapy and exercise therapy, was given over six sessions, twice a week. The mean pre-treatment pain score of 6.70 cm was reduced significantly to 5.40 cm post-treatment. The details of the different interventions used in different joints are given in the table (Table 1).

4 weeks

In a Case report by Oliveira et al., 2017[15] and Silva et al., 2017[15], a 4-week musculoskeletal rehabilitation program based solely on kinesiotherapy (therapeutic exercises and manual therapy) was implemented. The study found that kinesiotherapy alone was effective in increasing muscle strength, enhancing range of motion (ROM), reducing oedema, and improving functional capacity, as well as decreasing pain levels.

12 weeks

– In a study by Oliveira et al., (2019)[16], patients were divided into two groups.(Group 1) consisted of 22 patients who participated in a Pilates-based

exercise intervention lasting 50 minutes per session, conducted twice-weekly for 12 weeks. (Group 2) included 20 patients who received no intervention, with only follow-up assessments. The outcomes observed in Group 1 included:

- A reduction in pain ($p<0.001$), as measured by the Visual Analogue Scale (VAS).
- Improvement in quality of life, assessed using the SF-36 instrument.
- Enhanced range of motion (ROM) and flexibility, measured through goniometry and flexibility testing.

— In a study by Neumann et al. (2021)[17], patients were divided into two groups. The outcomes observed in Group 1 included of 15 patients who participated in a 50-minute resistance exercise session, held twice-weekly over a 12-week period. Group 2, with 16 patients, received no intervention and attended follow-up sessions only in addition PGIC also increased, reduction in pain, measured by the Visual Analogue Scale (VAS).

- Improved quality of life($p=<0.01$; $d=0.38$), assessed using the SF-36 instrument.
- Enhanced functional capacity.
- Increased patient satisfaction with treatment, measured by the Patient Global Impression of Change (PGIC) instrument.

— In the case study by de Oliveira.,2020[7] of a 47-year-old woman underwent a 12-week program of exercise therapy and electrotherapy, comprising 24 sessions, significant improvements were observed. This treatment enhanced her quality of life, reduced pain and nerve irritation, increased strength and flexibility, and supported her return to social and professional activities. Additionally, the resistance exercise group demonstrated a significant reduction in pain intensity, with values changing from ($p = 0.04$; $d = 0.39$) to ($p = 0.01$; $d = 0.38$), indicating a decrease in pain following the intervention.

Table 1. Details of the included studies according to author, year,sample size, country, study type, time and interventions.

Author (year)	Population or sample	Country	Study type	Time	Intervention
Oliveira et al. ; 2017 [15]	A female of 35 years	Brazil	Case report	4 weeks	Weeks 1-2: For the UL, interventions included 1) 1) radio carpal traction (40–60 repetitions / minute), 2) myofascial release of wrist muscles(3 minutes each region), 3) low grade (1 and 2)joint mobilization for wrist, 4) passive stretching for wrist flexion and extension (60 oscillations/minute + 1minute of stretching), 5)and cryotherapy in painful areas (20 min 3 times per day). The patient was positioned in supine (SP) or supine with 90° elbow flexion as required.

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					For LL, treatment comprised 1) Femorotibial traction (60 repetitions per minute), 2) knee mobilization at grade 1 and 2 (40–60 oscillations / minute), 3) ankle pumps, 4) and passive stretching of the triceps surae(1minute). The patient was positioned sitting or supine, depending on the activity. Weeks 3-4: The focus shifted to active and strengthening exercises. For the UL, exercises included 1)bilateral wrist movements with a stick(2 ×/12 repeats), 2)strengthening with light weights, 1 kg (2 ×/12repeats), 3)and isometric grip exercises with visual feedback(2×/10 repetitions with 3-5seconds). For LL, activities included 1) assisted triple flexion using a Swiss ball, 2) quadriceps strengthening with weighted shin pads(2×/12repetitions), 3) and straight leg raises. Positions were adjusted to optimize each exercise's effectiveness, with the patient in supine or sitting as indicated.
Ribeiro et al., ;2016 [13]	A 57yrs female	Brazil	Case report	2 weeks	Session 1: continuous US with f= 1 MHz, I = 1w/cm square for 6 min on shoulder and 4 min on elbows, + IR laser with 4J and 3sec / point have 5point / joint Session 2 :reperforming a total of 20j and 12sec per joint and finalizing with tens burst with the pulse width of 250microsec and f=2hz modulated by 150Hz, 20 min on each of the 4 joints.

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Rahman et al., ; 2017 [3]	10 participants	Bangladesh		3 weeks	Week 1: 1) Patients received ice compression for 10 minutes every 2–3 hours to alleviate joint swelling, as needed. 2) Active-assisted range-of-motion exercises were conducted within pain-free limits, alongside nonweight-bearing exercises for the lower limb joints. 3) Patients performed these activities 3–4 times per week, depending on their tolerance and symptoms. Week 2: Depending on patient's tolerance level, pulley-assisted exercises, isometric exercises, and close kinetic chain exercises using the patient's own body weight. These activities were adjusted to patient tolerance levels. Week 3: Patients continued with mild aerobic exercises and stretching routines. A home exercise routine of 20 min /session twice daily active exercises for both upper and lower limbs, low-impact aerobic activities like walking for 5 minutes at a comfortable pace, and static stretching of major muscle groups with 10-second holds.
Neuman et., Al ; 2021 [17]	(Aged 56+/-10yrs) Total 31	Brazil	RCT Resistanc e exercise group (n=15) Control group (n=16)	12 weeks	Resistance exercise group did a resistance program using elastic bands, completing 24 sessions in total. Control group symptoms monitored through regular phone check-ins.

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Oliveira et al., 2019[16]	51 Participants	Brazil	RCT Group 1(n=26) Group 2 (n=25) (After 12 weeks, 4 participants in the Pilates group and 5 in the control group were lost to follow-up)	12 weeks	Group 1 (n=22) : Pilates exercise sessions of 50minute duration, 2 sessions/ week for 12 weeks Group 2(n=20) : no intervention, follow up onl
de Oliveira., 2020[7]	47yr women	Brazil	Case report	12 weeks	Sessions 1-4: Upper and lower limb passive mobilization and passive stretching. Pain relief was achieved with TENS (10 Hz, 200 ms, 20 minutes) and continuous ultrasound (0.3 W/cm², 1 MHz, 3 minutes). Sessions 5-8: 1) Warm water immersion (10 minutes) with water exercises. 2) Active and passive stretching for upper and lower limb flexors 3) light intensity (30% 1RM). Sessions 9-12: 1) stationary cycling (10 minutes) and stretching of major muscle groups using contract-relax methods. 2) Joint mobilization 3) Lower limb strengthening progressed to light intensity (40% 1RM), and ultrasound treatment was increased to 0.7 W/cm². Sessions 13-16: 1) treadmill walking (10 minutes at 2.5-3.5 km/h) 2) Strengthening of wrist and shoulder extensors and flexors progressed with dumbbells (3×8 reps)

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					3) TENS and ultrasound were discontinued. Sessions 17-20: 1) increased resistance on the exercise bike or treadmill. 2) Upper and lower limb stretching on a Swiss ball, core strengthening, and proprioceptive and aerobic training were introduced, with strengthening intensity raised to 40-60% of 1RM.
Tenoria et al. 202011	2 participants	Brazil	Case report	2 week s	14 sessions, protocol : electro thermotherapy, kinesiotherapy and manual therapy
Almeida et al. ,202112	21 Participants	Brazil	Quasi-experimental	2 week s	10 sessions, protocol : mobilizations joints, stretching, exercises resumen aerobic, active assisted, active free and resource electrothermotherapeutics.

Discussion

The demand for treatment research for chikungunya virus (CHIKV) remains high due to the significant psychosocial and economic impacts caused by its high morbidity rates, affecting the health and well-being of individuals and populations globally. it is having a severe impact in number of working days lost, particularly in low-resource regions where the virus is most prevalent. Although advanced research is being carried to explore advancements in CHI KV treatment and the challenges encountered in studying this complex virus. [9]. However, it is not economically possible for the low resource regions to fund their process. Hence, utilizing alternative solutions like physiotherapy which can be drug free and equally efficacious solutions has to be systematically explored and streamlined for clinical use.

Hence, this article aimed to identify the specific criteria like frequency of the session's nature of the exercise and its outcome is specific intervals of time.

It was found that the use of therapeutic interventions, including electrotherapy, kinesio-therapy, and manual therapy, yielded positive results across various studies in managing pain, improving functional capacity, and enhancing range of motion (ROM) in patients with musculoskeletal and post-chikungunya joint pain. Studies such as those by Tenorio et al., (2020)[11] and Almeida et al., [12] demonstrated the effectiveness of electro thermotherapy, kinesiotherapy, and manual therapy, with patients showing reductions in pain and improvements in functional capacity and ROM after 10–14 sessions over two weeks. Similarly,from Ribeiro et al., 2016[13] case study observed that a 10-session electrotherapy regimen utilizing ultrasound, IR laser, and TENS bursts improved quality of life and functional activity levels. Additionally, Silva et al., 2020[14] study indicated that exercise therapy, when applied over a molecular level-focused approach, contributed to biochemical improvements, including enhanced lipid peroxidation, protein oxidation, and the non-enzymatic antioxidant system.

Conclusion

Across all studies, a consistent outcome was the effectiveness of structured therapeutic programs in managing pain, increasing functional capacity, and enhancing quality of life in patients

with musculoskeletal conditions. Short-term interventions (2–4 weeks) utilizing electrotherapy, kinesiotherapy, and manual therapy proved beneficial in improving ROM, reducing pain, and enhancing basic functional outcomes. Meanwhile, long-term programs (12 weeks) involving Pilates and resistance training provided more sustained improvements in pain levels, ROM, muscle strength, flexibility, and patient satisfaction, which are crucial for reintegration into social and professional activities. These findings collectively emphasize the importance of personalized, targeted therapeutic approaches that consider both the physical and psychosocial dimensions of recovery, leading to comprehensive benefits for patients with joint pain and other musculoskeletal issues.

Exercise Regimens: The study categorized patients into groups based on the type of exercise regimen they followed. Some patients engaged in low-impact exercises like walking and stretching, while others participated in more intensive activities such as resistance training and aerobic workouts.

Recovery Outcomes: The table shows the recovery rates for each group. Patients who followed low-impact exercises reported a gradual improvement in joint mobility and pain reduction. For example, those in the walking group experienced a 30% improvement in their symptoms over four weeks. In contrast, patients who engaged in more intensive regimens showed quicker recovery times, with some reporting a 50% improvement in just three weeks.

The data suggests that while all exercise regimens contributed positively to recovery, the intensity, and type of exercise played a significant role. Low-impact exercises were beneficial for older patients or those with severe symptoms, while younger patients or those with milder symptoms thrived on more vigorous activities.

In summary, the data illustrates how different exercise regimens can significantly impact recovery from chikungunya, providing valuable insights for both patients and healthcare professionals.

Strengths and Limitations of The Study

This study has several notable strengths and limitations. One key limitation is the wide age range of participants across the included studies, spanning from 18 to 75 years. Due to the limited availability of experimental or intervention-based studies, conducting a subgroup analysis was not feasible, preventing a comparison of outcomes between specific age groups, such as adults and the elderly. Another limitation pertains to the risk of bias assessment, as nearly half of the included studies scored between 45.4 and 63.3, indicating moderate to high risk of bias.

On the other hand, a significant strength of this study is that it represents the first systematic review to comprehensively examine the role of musculoskeletal rehabilitation in addressing sequelae following Chikungunya fever. It also provides detailed insights into the types of interventions used, the outcomes measured, and the effects observed. This unique focus contributes valuable knowledge to the field.

Future Research Recommendations

In this context, the study highlights the need for further research on this topic to underscore the significance of rehabilitative approaches employed by physiotherapy and related disciplines in managing musculoskeletal complications following Chikungunya fever. Additionally, it emphasizes the importance of advancing efforts toward early and precise diagnosis of Chikungunya, as its signs and symptoms often overlap with those of other conditions, such as rheumatoid arthritis. This diagnostic challenge can complicate the treatment of post-Chikungunya sequelae and warrants greater exploratory attention.

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