Review of Contemporary Philosophy
ISSN: 1841-5261, e-ISSN: 2471-089X
Vol 22 (1), 2023
Pp 3841 - 3852

Juvenile Idiopathic Arthritis: Management and Benefits of Physical Therapy-An Updated Review

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Abstract:

Background: Juvenile Idiopathic Arthritis (JIA) is a common chronic rheumatic disease in children, often leading to severe joint damage and a variety of functional impairments such as muscle weakness, decreased endurance, and limited mobility. As these children experience reduced quality of life (QOL) due to these physical limitations, physical therapy (PT) is an essential part of their management, aiming to alleviate pain, restore function, and improve overall physical health.

Aim: This review aims to explore the benefits of various physical therapy modalities in managing JIA, emphasizing pain relief, joint mobility, muscle strength, and overall functional improvement. The study also evaluates how customized rehabilitation programs can help in addressing the unique needs of each child with JIA.

Methods: The review presents evidence from randomized controlled trials (RCTs) and other clinical studies on different PT techniques, including hydrotherapy, heat therapy, stretching exercises, resistance training, and aerobic conditioning. These interventions were analyzed for their effects on pain management, muscle relaxation, joint mobility, and physical fitness.

Results: The review highlights the positive impact of several PT interventions, including hydrotherapy, which improves joint mobility and muscle strength without exacerbating pain. Studies also indicate that low-intensity exercises, such as Pilates and water-based activities, lead to significant improvements in pain

reduction and functional capacity. Furthermore, aerobic and anaerobic conditioning have been shown to enhance cardiovascular fitness and overall physical performance in children with JIA.

Conclusion: Physical therapy plays a crucial role in managing JIA, with numerous benefits ranging from pain relief and muscle relaxation to improved joint function and fitness. It is essential to tailor rehabilitation programs to meet the specific needs of each child, considering the severity of their condition and the importance of maintaining adherence to exercise regimens.

Keywords: Juvenile Idiopathic Arthritis, physical therapy, pain management, joint mobility, hydrotherapy, muscle strength, aerobic conditioning.

Received: 10 october 2023 **Revised:** 24 November 2023 **Accepted:** 08 December 2023

Introduction:

The most prevalent chronic rheumatic disease affecting children is juvenile idiopathic arthritis (JIA) [1]. Subluxation, fusion, and irreversible joint changes are frequently the result of the condition's severe structural damage to joint surfaces and related components. Affected children frequently have muscle weakness, atrophy, decreased endurance, impaired gait, decreased exercise capacity, and overall degraded function and quality of life (QOL) in addition to joint issues [2]. A significant percentage of patients need additional joint replacement procedures, and the hips, knees, and ankles are commonly affected [3]. Continuous physical therapy (PT) is therefore very helpful and should ideally be started before the development of severe joint abnormalities and functional impairment. Restoring optimal joint function is the main goal of physical therapy, which calls for customized rehabilitation plans based on each patient's unique needs and the features of their disease. These programs also need to consider different facets of social adaptation, like integrating younger children into school, bringing parents into therapy, or teaching older children self-care skills to help them become more independent [4]. The therapeutic benefits of several physical therapy methods are highlighted in this study. These benefits include effects on pain management, joint mobility, muscle relaxation, anaerobic and aerobic fitness, muscular strength, posture, gait, quality of life, and the prevention of decreased bone mineral density (BMD).

Muscle Relaxation and Pain Relief

The first line of treatment for acute joint inflammation usually consists of passive-assistive motions performed without gravity. Joint discomfort and muscle tension can be reduced by slow, rhythmic motions that are within a pain-free range of motion [5]. Orthotic devices like stabilizer splints are advised for individuals with chronic joint contractures in order to stretch and stabilize flexion abnormalities. Another successful technique is gradual casting, which involves removing the cast for vigorous 20-minute stretching sessions every 24 to 48 hours and then placing it to optimize extension. At least twenty-three hours a day should be spent maintaining casting [6]. Hydrotherapy is a useful supplement for strength training, contracture management, stretching, and muscle relaxation. Joint-specific exercises include knee motions like walking or hopping underwater, as well as hip flexion, extension, and abduction. With a limit of 30 repetitions per joint and sufficient rest periods in between exercises, sessions usually take place two to three times a week [7]. The exercises were well accepted and did not worsen pain symptoms, even though two randomized controlled trials (RCTs) on hydrotherapy in JIA patients did not yield statistically significant results [7]. High-impact sports like basketball, football, and gymnastics that put strain on the ankles are not recommended over aquatic exercises, which also aid to lessen discomfort and avoid muscular spasms [6].

Low-intensity activities appear to reduce the worsening of pain. Klepper assessed children with chronic arthritis who participated in a weight-bearing physical conditioning program that lasted eight weeks and consisted of twenty-four sessions of low-impact activities. Average pain levels decreased from baseline to post-intervention testing, but no discernible changes were observed in visual analog scale (VAS) pain scores during exercise sessions [8]. According to Azab et al., Pilates exercises combined with regular physical therapy produced better results and were more effective at lowering pain levels than standard PT

by themselves [9]. In 30 children with JIA, Elnaggar examined the effectiveness of combining interferential current therapy with resistance underwater workouts. Researchers evaluated quadriceps and hamstring torque and pain levels prior to treatment, as well as at one and three-month follow-ups, using sophisticated instruments such the HUMAC NORM system and VAS. With the exception of left quadriceps torque and pain levels, Group B, which received underwater exercises and interferential therapy, had greater gains in all measures, underscoring the potential advantages of such combination interventions [10]. Heat therapy reduces pain and muscular spasms, improves the flexibility of fibrous tissues in tendons and joint capsules, and efficiently reduces joint stiffness.

The ideal temperature (40–45.5°C), the length of the therapy (3–30 minutes), and the particular treatment location all affect how beneficial heat is. While warm soaks are helpful for nocturnal discomfort, simple steps like taking a hot shower can help with morning stiffness. Large, deep-heating joints like the hips benefit greatly from ultrasound therapy [6]. Additionally promising is the use of pulsed neodymium-doped yttrium aluminum garnet (Nd:YAG) lasers for high-intensity laser treatment (HILT). 15 youngsters in a study by El-Shamy et al. got HILT in addition to a regular exercise program, whereas a placebo group performed the same exercises without HILT. The effectiveness of this technique was shown by the results, which showed a significant reduction in pain in the treatment group at both 4-week and 12-week follow-ups [11]. Another alternative for treating acute inflammation is cold therapy, which reduces discomfort and constricts blood vessels. Despite its efficacy, its widespread use is restricted by adverse effects such cryoglobulinemia and cold urticaria, as well as children's low tolerance. In order to cause a hyperemic reaction, therapy sessions usually last 20 minutes [6]. Additionally, massage treatment has been assessed as an adjuvant intervention. According to Field et al., children, parents, and doctors evaluated the degree of pain, anxiety, and cortisol levels after receiving a 15-minute daily parental massage for 30 days. In children with mild to moderate JIA, massage therapy also reduced pain-limiting activities, improving functional results [12].

Joint Mobility

Physical therapy (PT) interventions include strategies aimed at reducing muscle tone and carefully stretching spasmodic muscles to restore their physiological range of motion. Such approaches are vital, particularly for addressing pain in juvenile idiopathic arthritis (JIA), as unmanaged pain can significantly impact the quality of life (QOL) both during childhood and into adulthood [5,13]. In cases of lower limb flexion contractures, pain or inflammation may progressively restrict joint range of motion [14]. Children diagnosed with the oligo-articular subtype of JIA often experience hip and knee flexion contractures, predominantly affecting the lower extremities [14]. Hip flexion contractures frequently lead to increased lumbar lordosis, which presents as an abnormal gait characterized by a forward-projected abdomen and buttocks. Research by Bacon et al. demonstrated significant improvements in hip rotation angles and overall joint mobility following a six-week water-based training program for children [6]. Additionally, static night traction has been suggested as a supplementary intervention to PT, particularly for reducing knee flexion contractures. Chronic knee flexion can cause hamstring muscle contraction, which may benefit from static stretching to enhance active range of motion. Stretching protocols typically involve holding positions for at least 15 seconds, with three repetitions per session and up to four sessions daily [15,16]. Despite these findings, the long-term efficacy and overall impact of such non-invasive techniques for JIA remain uncertain and necessitate further investigation. Resting splints are frequently employed during the acute phase of JIA to position the affected joint in neutral extension, thus preserving joint function and delaying ankylosis, which progresses more rapidly in children compared to adults. Wrist splints, finger ring splints, and knee flexion-preventing splints are commonly used for this purpose [17]. Dynamic splints, which apply controlled force to achieve hyperextension, must be carefully managed to prevent subluxation. For optimal outcomes, low-force splints worn over extended periods (10–12 hours) are preferred [17].

Stretching exercises form the foundation of interventions aimed at improving range of motion (ROM). Standard practice involves holding stretches for at least 10 seconds, performing five to ten repetitions per session twice daily. The "contract-relax" technique is regarded as particularly effective. This

method involves passively stretching the joint, followed by the patient actively flexing the joint against resistance, before returning the joint to a neutral position [17]. Research by Baydogan et al. highlights the efficacy of combining muscle-strengthening exercises with proprioceptive training to enhance lower limb function in children with JIA. Significant improvements were observed in pain reduction, muscle strength, and postural balance [18]. Interventions included isometric knee extensor exercises and active ROM exercises, such as performing eight to ten repetitions of knee extensions with weights (e.g., small sandbags) attached to the ankle. Over a 12-week period, the number of repetitions was gradually increased to 10–15 per session, with one session performed daily. Incorporating massage therapy alongside these exercises was also found to effectively reduce joint swelling and stiffness [12].

Aerobic and Anaerobic Conditioning

Localized muscle weakness and atrophy around inflammatory joints are common causes of decreased aerobic and anaerobic capacity in children with JIA [7,20]. The cycle of inactivity and deteriorating fitness in these individuals has been successfully broken by exercise regimens intended to counteract deconditioning and enhance functional abilities [21]. It has been demonstrated that 30 minutes a day of moderate-intensity exercise greatly increases aerobic capacity [6]. Cardiovascular health has also been shown to benefit from high-intensity interval training (HIIT). Singh-Grewal examined the effects of HIIT and low-intensity training on children with JIA aged 8 to 16 in a randomized controlled experiment. Participants participated in a 12-week program that included three times-weekly, intense aerobic activities for the experimental group and qigong exercises for the control group [22]. Peak power and maximal oxygen consumption were evaluated before and after the intervention, and submaximal oxygen intake (VO2submax) at 3 km/h was one of the primary outcomes. Physical function was evaluated using the Childhood Health Assessment Questionnaire (CHAQ). VO2submax and other parameters did not significantly differ between the groups, according to the results; nevertheless, CHAQ scores significantly improved for both groups. Crucially, less demanding practices like as qigong showed benefits that were equivalent to those of more intensive programs, highlighting the significance of adherence for kids with JIA [22].

Bayraktar looked into how an eight-week water-based fitness program affected the kids with JIA's ability to exercise. Although the training group's anaerobic capacity increased considerably, the control group showed no changes, and neither group's aerobic capacity was impacted [23]. In a similar vein, Gualano found that hydrotherapy with land-based workouts improved aerobic fitness at a rate that was comparable to that of land-based exercises alone [24]. Furthermore, a study comparing intense and low-to-moderate-intensity exercise regimens revealed no negative side effects, supporting the safety and therapeutic advantages of exercise for JIA patients [22,24]. The choice of regimen should put adherence and the needs of each patient first, even if many exercise modalities—such as hydrotherapy, aerobic, and anaerobic training—have shown safety and effectiveness in enhancing physical function for kids with JIA. To investigate the long-term effects and ideal level of intensity of these therapies, more research is necessary.

Muscle Strength

Muscle atrophy and alterations in joint function are partially responsible for the mobility and balance impairments commonly seen in children and adolescents with Juvenile Idiopathic Arthritis (JIA). These deficiencies are further exacerbated by longer rest durations and less physical exercise than their healthy counterparts [25]. Consequently, especially in the chronic stages of JIA, muscle-strengthening exercises are essential to its care. Thirty to fifty percent of patients with oligo-articular JIA have knee involvement at the time of diagnosis, characterized by unilateral pain, swelling, tenderness, and bursitis [26]. Children with JIA are less able to engage in physical activity as a result of this knee involvement, which frequently causes quadriceps atrophy in the afflicted leg and muscular weakness [26]. According to a single-blind, randomized controlled experiment, JIA patients may gain more from less strenuous physical activities, which have advantages that are comparable to those of more demanding exercise programs [22].

Hydrotherapy in conjunction with muscle-strengthening activities is helpful for kids with hip involvement [7]. Leg muscle strength was improved without aggravating pain in a randomized controlled trial assessing the efficacy of a 12-week fitness program for JIA patients that included workouts for the arm, hip, and core muscles as well as activities like skipping rope [27]. A safe way to improve muscles and bones and maybe lessen fatigue is through home-based exercise regimens, which can include movements like leaping, handgrips, and resistance training that are gradually introduced over a few weeks [28]. Armand's study looked at how two task-oriented activity training regimens affected the involvement and performance of kids and teenagers with JIA. 62 patients participated in the study and were split into two groups at random. One group used virtual reality (Xbox 360 Kinect) to do everyday tasks, while the other group used real-world materials. Both groups demonstrated notable gains in muscle strength, grip strength, discomfort levels, and other activity performance metrics after 8 weeks of training. Interestingly, the virtual reality group performed better on the Duruoz Hand Index (DHI), the Canadian Occupational Performance Measure (COPM), and upper limb muscle strength [29].

Gait and Posture Improvement

The lower extremity joints, especially the knees and ankles, are most frequently affected by JIA, though it can affect any joint [30]. The kinetic chains and systemic gait traits, including posture and trunk lean, are changed by arthritis in these joints. Joint pain, trouble participating in physical activities, or the early onset of weariness after exercise are all possible consequences of these alterations over time [32]. Thus, it is strongly advised that JIA patients get therapeutic measures targeted at improving or preserving their gait and mobility. The effects of incorporating core stability exercises into traditional physical therapy (PT) for kids with polyarticular JIA (poly-JIA) were investigated in Elnaggar's study. Thirty-three youngsters between the ages of 10 and 14 were divided into two groups at random: one group received regular physical therapy, while the other group combined traditional physical therapy with exercises for core stability. A 6-minute walk test showed that the experimental group had significantly improved their functional capacity over the course of the three-month program, walking farther than the control group [33]. Kuntze's study used a 12-camera motion analysis system while walking on a fixed-speed treadmill to compare the gait kinematics of young people with JIA to those of young people who are normally developing. The young people with JIA showed abnormalities in bilateral joint angles, including greater hip flexion at the beginning of locomotion, knee extension, and hip extension during terminal posture, even though they had little pain and little disease activity. These results shed light on JIA's secondary effects on gait and offer guidance for physical treatment techniques meant to help afflicted persons improve their gait mechanics [34]. In order to compare the effects of proprioceptive-balance exercises and strengthening exercises on lower extremity function, 30 JIA patients were split into two groups for a different study by Baydogan et al. In order to improve walking, stair climbing, and balance, the study found that balance-proprioceptive activities were superior to strengthening exercises [18].

Bone Density Increasing

Fragility fractures and low bone mineral density (BMD) are well-established long-term consequences of JIA that frequently result in substantial morbidity [35]. When BMD decreases in early to middle adulthood, children with JIA who do not achieve adequate peak BMD are more likely to develop osteoporosis later in life. When compared to healthy persons who are matched for age, sex, height, and weight, adults with a history of JIA, both male and female, show reduced bone mass and increased bone turnover [36]. Long-term use of glucocorticoids to treat JIA is also linked to increased calcium excretion through renal tubules and decreased intestinal absorption of calcium, which may result in a negative calcium balance. Furthermore, the RANKL/RANK/OPG system may be upset by pro-inflammatory cytokines such tumor necrosis factor (TNF-), too much glucocorticoid, and low gonadal hormone levels, which could alter the equilibrium between osteoclast activity and osteoblastic matrix synthesis [37].

The impact of supplementing traditional physical therapy with core stability exercises on bone mineralization in children with poly-JIA was assessed by Elnaggar et al. According to dual-energy X-ray absorptiometry (DXA), bone mineralization of the lumbar spine and femoral neck significantly improved in

the group that underwent core stability exercises after three months of treatment [32]. The evidence on weight-bearing exercise therapies intended to reduce the risk of low BMD in children with JIA was also evaluated by Gannotti et al. Their results showed that low-impact workouts are safe for kids with JIA and that weight-bearing activities successfully raise BMD in healthy kids. Although more study is required to identify the ideal intensity, duration, and frequency of weight-bearing activities to decrease the risk of low BMD in this population, these studies support the inclusion of weight-bearing exercises in exercise regimens for JIA patients [38].

Quality of Life

There is currently limited evidence supporting the improvement of quality of life (QOL) as a direct result of exercise interventions in children and adolescents with Juvenile Idiopathic Arthritis (JIA) [25]. However, Takken et al. emphasize the importance of providing exercise opportunities for patients with JIA, as such activities are crucial for enhancing physical fitness. The absence of adequate physical fitness is known to significantly affect both health and quality of life. Beginning in the second decade of life, VO2peak decreases annually by 0.41 ml/kg/min, underscoring that a lack of physical fitness may eventually hinder an individual's capacity to perform daily activities as they age [40]. Epps et al. further examined the outcomes of combining hydrotherapy with land-based physiotherapy and compared it to land-only physiotherapy. Their findings revealed that the combined therapy group demonstrated a greater improvement in QOL than the land-only group [41]. Brostrom et al. conducted a comparison of plantar- and dorsiflexor strength between young girls with polyarticular JIA and healthy, age-matched controls, revealing that girls with JIA exhibited significantly lower muscle strength than their healthy peers. These results suggest that children with JIA are likely to engage in less physical activity, which negatively impacts their ability to perform daily tasks, thereby reducing their overall quality of life [42]. Furthermore, hand and wrist joint involvement is common in JIA, often resulting in a decline in hand function and impairing the ability to perform activities of daily living. Rashed et al. investigated the relationship between handgrip strength (HGS), disease activity, disability, and QOL in children and adolescents with JIA. They used a dynamometer to measure HGS in 23 JIA patients and 46 age- and sex-matched healthy controls. The results indicated that children with JIA had significantly weaker handgrip strength (p 0.001) compared to the controls, and this weakness was directly associated with a lower QOL. As a result, evaluating HGS could serve as a simple and non-invasive method to assess disease activity, disability, and QOL in JIA patients [43].

The physiotherapist is an integral member of the multidisciplinary rehabilitation team, which also includes the rheumatologist, physiatrist, occupational therapist, and orthotist. These professionals collaborate in applying treatment plans as outlined by the physiatrist, under the guidance of the rheumatologist. As such, the physiotherapist plays a pivotal role in managing children with JIA throughout the progression of the disease, conducting regular assessments that provide valuable insights into disease activity. Although exercise interventions in JIA patients can vary widely in their design and outcomes, certain common elements have been identified across successful regimens. Passive-assisted mobilizations, static splinting, hydrotherapy, exercises coupled with interferential current therapy, weight-bearing activities, Pilates, and heat treatments are all recommended for muscle relaxation and pain reduction. For improving joint mobility, stretching, dynamic splints, proprioceptive exercises, proprioceptive aerobic training, static night traction, and heat therapy are advisable. Enhancing both aerobic and anaerobic conditioning can be achieved through high-intensity interval training (HIIT) and land-based exercises, either alone or in combination with hydrotherapy. To enhance muscle strength, therapies such as hydrotherapy, rope skipping, exercises targeting the core, hips, and arms, at-home exercise equipment (e.g., jump ropes, hand grippers, and resistance trainers), as well as task-oriented activity training using real-world materials and computer-based games, are recommended. Key interventions for improving gait and posture include strengthening exercises for handgrip, plantar- and dorsiflexor muscles, weight-bearing exercises, and core stability training. Additionally, such exercises play a crucial role in promoting bone density in JIA patients.

Conclusion:

Juvenile Idiopathic Arthritis (JIA) presents a significant challenge due to its impact on joint health, muscle strength, and overall functional abilities. Early and continuous physical therapy (PT) intervention is vital to mitigating the adverse effects of JIA on children. This updated review highlights the comprehensive benefits of PT techniques, such as hydrotherapy, stretching exercises, resistance training, and aerobic conditioning. These therapies not only provide relief from joint pain and muscle spasms but also enhance joint mobility, muscle strength, and aerobic capacity. Hydrotherapy, a prominent PT method, has been shown to effectively improve joint function without increasing pain, making it an ideal option for children with JIA. In particular, underwater exercises help reduce joint stiffness and muscular spasms, contributing to enhanced mobility and comfort. While studies on hydrotherapy have yielded mixed results, the general consensus is that it provides significant benefits, especially when combined with other therapeutic modalities like interferential current therapy. Additionally, low-impact aerobic exercises and resistance training have demonstrated a positive effect on physical fitness, with some studies suggesting that even low-intensity exercise programs can yield substantial improvements in both pain management and QOL. Stretching exercises are another cornerstone of PT for JIA patients, helping to restore joint range of motion (ROM) and alleviate contractures. These exercises, particularly those targeting the lower limbs, are crucial for preventing joint deformities that may arise from prolonged immobility. Moreover, strength training is integral for children with JIA, as muscle atrophy is common due to inactivity and joint inflammation. Regular resistance exercises can help strengthen muscles, thereby improving mobility and balance. Although the therapeutic benefits of PT are clear, the effectiveness of various interventions often depends on the adherence of children to prescribed exercise regimens. Personalized rehabilitation programs that cater to the unique needs of each child are essential to maximizing outcomes. Furthermore, combining PT with other treatments, such as pharmacological therapies, can offer a more holistic approach to managing JIA. In conclusion, physical therapy is a cornerstone of JIA management, offering substantial improvements in pain relief, joint function, and overall physical health. Continued research is necessary to refine PT protocols and explore long-term outcomes, ensuring that children with JIA can maintain an active, functional lifestyle and improve their quality of life.

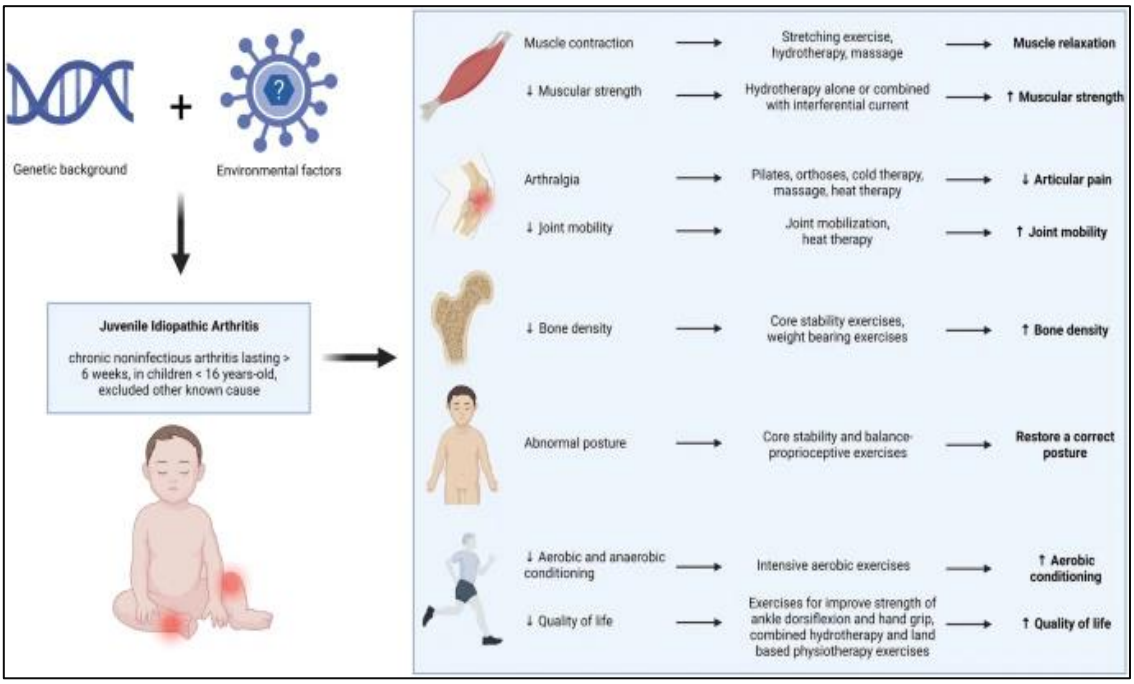

Figure 1: Physical Therapy for Juvenile Joint Arthritis.

Recommendations for Children with Juvenile Joint Arthritis:

The purpose of this intervention strategy is to enhance the management of Juvenile Idiopathic Arthritis (JIA) through various therapeutic modalities aimed at addressing key aspects such as muscle relaxation, pain relief, joint mobility, muscle strength, gait and posture improvement, increased bone density, and overall quality of life. These interventions are selected based on their effectiveness in promoting physical recovery and improving functional capabilities of affected individuals, particularly children.

Recommended Interventions

- **Muscle Relaxation and Pain Relief:** Several therapeutic techniques have been proposed for the alleviation of pain and muscle relaxation in children with JIA. These include passive-assistive movements that aid in joint and muscle mobility, the use of stabilizer splints to minimize joint strain, and hydrotherapy, which provides pain relief through buoyancy and controlled water resistance. A combination of resistive underwater exercises and interferential current therapy has shown to be beneficial for muscle relaxation and pain reduction. Weight-bearing exercises, Pilates, and heat therapies such as ultrasound and LASER therapy also play a crucial role in minimizing pain and improving muscle flexibility. Additionally, massage therapy has been included as a method to promote relaxation and enhance circulation, contributing to pain management and muscle relief.
- **Joint Mobility:** To enhance joint mobility in individuals with JIA, a variety of interventions have been suggested. These interventions include static night traction, which helps in relieving joint stiffness during rest, and various stretching techniques aimed at improving the range of motion. Dynamic splints are used to support joint alignment and mobility, while intensive aerobic exercise programs are beneficial for maintaining joint function through movement and strengthening. Proprioceptive exercises, which involve training the body's sense of position, further support the maintenance of joint stability. Heat therapy also plays an important role in promoting flexibility and easing joint discomfort.
- **Aerobic and Anaerobic Conditioning:** Both high-intensity interval training and land-based exercises, whether performed independently or in combination with hydrotherapy, have been demonstrated to significantly enhance cardiovascular endurance and overall fitness in individuals with JIA. These interventions not only improve physical endurance but also contribute to the development of strength and stamina, which are essential for managing daily activities.
- **Muscle Strength:** Hydrotherapy is particularly effective in improving muscle strength without placing excessive strain on the joints. Other muscle-building activities such as rope skipping, core strengthening exercises, and hip and arm muscle training are highly recommended. Home-based exercises, including jumping, handgrip, and resistance training, enable individuals to strengthen muscles within the comfort of their environment. Additionally, task-oriented activity training using real-life materials and video games has proven to be a motivating way to build muscle strength while encouraging functional independence.
- **Gait and Posture Improvement:** Core stability exercises, designed to enhance the strength of the abdominal and back muscles, are essential in improving posture and overall body alignment. Proprioceptive-balance exercises, which train the body’s ability to maintain stability in various positions, are critical for improving gait and reducing the risk of falls, thereby contributing to a more functional movement pattern.
- **Increased Bone Density:** To enhance bone density in children with JIA, conventional physiotherapy exercises combined with core stability routines are highly beneficial. Weight-bearing exercise programs, which encourage bones to support the body’s weight, are essential in stimulating bone growth and density. These exercises not only promote physical strength but also contribute to the prevention of bone-related complications associated with JIA.

- **Quality of Life Improvement:** Interventions aimed at improving overall quality of life for children with JIA include exercises to strengthen the plantar and dorsiflexor muscles, as well as handgrip strength exercises, both of which contribute to improved functional ability. A combined approach of hydrotherapy and land-based physiotherapy exercises has proven particularly effective in enhancing both physical function and emotional well-being, thereby improving the child's quality of life and their ability to engage in daily activities.

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الملخص:

الخلفية: التهاب المفاصل لدي اليافعين مجهول السبب (JIA) هو مرض روماتزمي مزمن شائع في الأطفال، وغالبًا ما يؤدي إلى تلف شديد في المفاصل وقيود وظيفية متنوعة مثل ضعف العضلات، وانخفاض التحمل، والقدرة المحدودة على الحركة. ومع تدهور جودة الحياة (QOL) للأطفال بسبب هذه القيود البدنية، يعد العلاج الطبيعي جزءًا أساسيًا من إدارتهم، بهدف تخفيف الألم، واستعادة الوظيفة، وتحسين الصحة البدنية العامة.

الهدف: تهدف هذه المراجعة إلى استكشاف فوائد تقنيات العلاج الطبيعي المختلفة في إدارة التهاب المفاصل لدي اليافعين مجهول السبب، مع التركيز على تخفيف الألم، وتحسين حركة المفاصل، وقوة العضلات، والتحسين الوظيفي العام. كما تقيم الدراسة كيفية مساعدة برامج التأهيل المخصصة في تلبية الاحتياجات الفريدة لكل طفل مصاب بـJIA.

الطرق: تعرض المراجعة أدلة من التجارب السريرية العشوائية (RCTs) ودراسات سريرية أخرى حول تقنيات العلاج الطبيعي المختلفة، بما في ذلك العلاج المائي، والعلاج بالحرارة، وتمارين الإطالة، وتمارين المقاومة، والتكييف الهوائي. تم تحليل هذه التدخلات لتقييم تأثيراتها على إدارة الألم، واسترخاء العضلات، وحركة المفاصل، واللياقة البدنية .

النتائج: تسلط المراجعة الضوء على التأثير الإيجابي لعدة تدخلات علاج طبيعي، بما في ذلك العلاج المائي، الذي يحسن حركة المفاصل وقوة العضلات دون تفاقم الألم. كما تشير الدراسات إلى أن التمارين منخفضة الكثافة، مثل بيلاتيس والأنشطة المائية، تؤدي إلى تحسن كبير في تقليل الألم والقدرة الوظيفية. علاوة على ذلك، أظهرت التكييفات الهوائية واللاهوائية أنها تعزز اللياقة القلبية الوعائية والأداء البدني العام للأطفال المصابين بـJIA.

الخاتمة: يلعب العلاج الطبيعي دورًا حاسمًا في إدارة التهاب المفاصل لدي اليافعين مجهول السبب، مع العديد من الفوائد التي تتراوح من تخفيف الألم واسترخاء العضلات إلى تحسين وظيفة المفاصل واللياقة البدنية. من الضروري تخصيص برامج التأهيل لتلبية الاحتياجات الخاصة بكل طفل، مع الأخذ في الاعتبار شدة حالته وأهمية الالتزام ببرامج التمارين.

الكلمات المفتاحية: التهاب المفاصل لدي اليافعين مجهول السبب، العلاج الطبيعي، إدارة الألم، حركة المفاصل، العلاج المائي، قوة العضلات، التكييف الهوائي.