

Effect of OA (Osteoarthritis) in Gym-Going Adults

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Abstract

Osteoarthritis (OA) has a profound impact on adults who engage in gym activities, influencing both their exercise choices and overall fitness experience. The degeneration of joint cartilage characteristic of OA often leads to pain and discomfort, which can significantly hinder the ability to participate in certain workouts. A study published in the "American Journal of Physical Medicine & Rehabilitation" found that individuals with knee OA reported increased pain levels during weight-bearing exercises, reinforcing the notion that joint stress during physical activity can exacerbate. The "Journal of Orthopaedic Research" highlights the correlation between joint stiffness and reduced physical activity levels in individuals with hip OA, underscoring its impact on mobility and exercise engagement. The reduced range of motion associated with OA further limits exercise options, emphasizing the importance of tailored fitness plans that accommodate joint limitations. Individuals with OA must adopt an individualized and adaptive approach to gym activities, incorporating low-impact exercises, joint protection strategies, and regular consultations with healthcare professionals to manage the unique challenges posed by this degenerative joint condition while maintaining an active and healthy lifestyle [1-3].

Exercise has been shown to have a stronger impact on physical function than osteoarthritis pain. Consequently, research to date indicates that exercise has only marginally positive effects on hip OA patients, with function seeming to outweigh pain [4]. Numerous exercise regimens, along with muscle strengthening (resistance training), stretching, range-of-motion exercises, cardiovascular and aerobic conditioning (walking and cycling), neuromuscular exercises, balance training, and Tai Chi, have been documented in the literature for individuals with OA. Exercise that strengthens has a big impact on results. Similar advantages have been observed with strengthening workouts that are isotonic (through range), isometric (without either movement), also isokinetic (done on particular devices) [5].

People with knee and hip OA participate in cardiovascular and/or resistance land-based exercise and aquatic exercise. For hand OA, both strengthening and range of motion exercises are recommended. Aerobic exercise, such as walking or cycling, is a popular choice to reduce pain which is commonly seen in people with osteoarthritis. All forms of exercise are linked to comparatively low adverse effects as compared to traditional pharmaceutical therapies.

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Introduction

The most prevalent type of arthritis in adults is osteoarthritis, which is characterized by loss of mobility and persistent discomfort. After age 40, osteoarthritis is more common, and its frequency rises sharply with age [6]. Everyday activities that are marked by progressively varied alterations in subchondral bone and articular cartilage. More than 80% of OA patients experience mobility restrictions and 25% exhibit substantial [7]. It has become clear in recent years that OA is a much more complicated condition that affects every tissue in the joint [8]. Since OA is presently incurable; the usual courses of treatment are joint replacement or pain management. Exercise is an integral component of conservative management for OA and is universally recommended by clinical guidelines [5].

Some Clinical Features of Osteoarthritis include

- **Cartilage Degeneration:** Osteoarthritis (OA) is characterized by the deterioration and degeneration of cartilage, which raises the friction between bones and reduces joint flexibility and discomfort.
- **Joint Pain:** Usually confined to the afflicted joint, the pain is frequently made worse by movement or bearing weight. Pain typically starts in the morning.
- **Stiffness:** People with osteoarthritis frequently report feeling stiff in the afflicted joints, especially in the mornings or after extended periods of inactivity.
- **Joint Swelling:** When cartilage is damaged, inflammation may result, which enlarges the area surrounding the injured joint.
- **Reduced Range of Motion:** As the illness worsens, the afflicted joint's range of motion may get smaller. This restriction may interfere with day-to-day activity and jeopardize joint health.
- **Crepitus:** The rubbing as well as grinding of rough surfaces and joint surfaces produces this sound or feeling.
- **Joint Instability:** A feeling of instability in the joints can be brought on by weakening or damage to the tissues and

ligaments that support the joints.

- **Osteophytes or Bone Spurs:** These are abnormal outgrowths of the bone that develop throughout time. Although these are a normal reaction to osteoarthritis, they may aggravate pain and stiffness in the joints.
- **Presentation:** OA can impair joints symmetrically or asymmetrically depending on the underlying reasons.

Etiopathogenesis

Our understanding of the etiopathogenesis of OA is incomplete. It is well-recognized that OA affects more than just cartilage; it is a complex illness affecting the entire joint. It is well recognized that biological, mechanical, and structural variables all contribute to the development and course of the disease [9].

It entails intricate alterations to the synovium, ligaments, periarticular muscles, subchondral bone, and articular cartilage in the joint. Several important elements have a major role in the onset and progression of osteoarthritis, even if the precise mechanisms are not entirely understood.

- **Formation of Osteophytes:** Osteophytes are spurs that grow in an attempt to support a joint; they can cause discomfort and restricted movement.
- **Mechanical Factors:** Osteoarthritis can develop due to repetitive mechanical stress or overloading of joints, particularly weight-bearing joints.
- **Articular Degeneration:** Proteoglycans, which offer resistance to compression, are present in the extracellular matrix of articular cartilage. Proteoglycans gradually disappear in osteoarthritis, which reduces the cartilage's capacity to absorb as well as distribute mechanical pressures. The cartilage matrix's collagen fibres deteriorate as well, weakening the tissue's structural integrity.
- **Osteoarthritis can Lead to Synovitis:** Pain and swelling in the joints could be caused by this inflammation. The production of cytokines, including interleukin-1 β and tumour necrosis factor-alpha, by inflammatory cells in the synovium can exacerbate the deterioration of cartilage.
- **Modifications to the subchondral bone**
- **Subchondral bone experiences remodelling:** resulting in alterations to bone density & the development of osteophytes.
- Subchondral bone microfractures can lead to discomfort and further cartilage degradation.
- **Post-traumatic osteoarthritis:** The development of osteoarthritis can be exacerbated by joint traumas, including fractures, ligament rips, and dislocations.
- **Hereditary predisposition:** Research has shown that a person's vulnerability to osteoarthritis may be influenced by genetic factors. A few genetic variants may have an impact on the composition and metabolism of joint tissues.

Classifications

Osteoarthritis (OA) is typically classified into different grades based on the severity of joint damage observed in imaging studies, such as X-rays. The grading system helps healthcare professionals assess the extent of joint degeneration and plan appropriate management strategies. The commonly used grading system includes three main grades

- **Grade-1 (Mild):** in the early stages of OA, joint damage is considered mild.

Characteristics: there might be minor wear and tear on the joint, with minimal loss of cartilage. Small bony outgrowths called osteophytes may start forming at the joint edges.

Symptoms: Individuals may experience occasional joint pain or stiffness, but the impact on joint function is typically minimal.

- **Grade-2 (Moderate):** In the moderate stage, there is more noticeable joint damage.

Characteristics: Cartilage loss is more evident, and osteophytes may be larger. The joint space may narrow, indicating increased degeneration.

Symptoms: Joint pain, stiffness, and decreased range of motion become more pronounced. Activities that involve the affected joint may become more challenging.

- **Grade-3 (Severe):** Severe OA is characterized by significant joint degeneration and structural changes.

Characteristics: Marked loss of cartilage, substantial osteophyte formation, and significant narrowing of the joint space are observed. The joint may undergo structural changes that impact its normal function.

Symptoms: Severe pain, stiffness, and a substantial reduction in joint function are common. Daily activities may be severely affected, and individuals may experience a diminished quality of life.

Types of OA include

- The most prevalent subtype of the condition, primary OA, is identified when there is no underlying trauma or illness but is linked to the risk factors mentioned above.
- When a joint problem already exists, secondary OA develops. Trauma or injury, congenital joint disorders, infectious arthritis, inflammatory arthritis, avascular necrosis, Paget disorder, osteopetrosis, osteochondritis dissecans, immune diseases (hemochromatosis, Wilson's disease), hemoglobinopathy, Ehlers-Danlos syndrome, as well as Marfan syndrome are among the predisposing conditions [10,11].

There Exists one Type of Classification of OA

- **Localized Osteoarthritis:** This kind of OA is restricted to one or a small number of joints. It could, for instance, solely impact the hand, hip, knee, or spine.
- **Generalized Osteoarthritis:** This type of OA affects several joints in the body. In addition to frequently affecting joints on both sides of the body, such as both hands or knees, it may also be linked to a broader range of symptoms.
- **Erosive Osteoarthritis:** A less prevalent type of osteoarthritis (OA) called Erosive Osteoarthritis (EOA) is characterized by joint degradation that resembles rheumatoid arthritis. It frequently affects the fingers' interphalangeal joints.
- **Traumatic Osteoarthritis:** Joint traumas such as fractures or dislocations might raise the possibility of osteoarthritis developing in the injured joint. This is commonly known as osteoarthritis caused by trauma.

Based on Joints OA can be seen in Various Joints

- **Hip Osteoarthritis:** This kind of osteoarthritis (OA) is unique to the hip joint and can cause discomfort, stiffness, and a reduction in hip range of motion.
- **Osteoarthritis of the Knee:** This affects your knee joints and causes pain, swelling, and mobility issues.
- **Hand Osteoarthritis:** This condition can cause discomfort, stiffness, and occasionally even noticeable joint abnormalities such as bony nodules in the fingers & thumb joints. Several factors contribute to the higher prevalence of hand OA in women, including hormonal factors, genetic predisposition, and the overall higher prevalence of OA in women compared to men.

- Osteoarthritis can impact the spine, especially the facet joints connecting vertebrae, resulting in symptoms including stiffness and back pain. This condition is known as spinal osteoarthritis (spondylosis). Additionally, it may exacerbate diseases like spinal stenosis.

Prevalence

Osteoarthritis is a major contributor to long-term disability and chronic pain in adults [6]. Osteoarthritis affected 595 million individuals worldwide in 2020 (95 percent uncertainty interval: 535–656), or 7.6 percent (95 percent UI: 6•8–8•4) of the world's population. Since 1990, the number of cases has increased by 132•2 percent (130•3–134•1) overall [6,12]. Estimates from the WHO indicate that, among women over 60, 18% and men, respectively, will develop symptomatic OA [9,6]. East Asia (137.3 million), South Asia (75.6 million), and Western Europe (57.0 million) had the highest rates of OA in 2019 [8]. Obesity and the current rise in life expectancy will probably make it more common [9].

Risk Factors

Obesity, gender, age, knee injuries, and high-impact activities like weightlifting, speed skating, and marathons are risk factors for Osteoarthritis (OA). It is now acknowledged that the main risk factor causing OA is aging. Numerous plausible physiological pathways explaining how aging exacerbates Osteoarthritis (OA) have been put forth recently. In the degradative articular cartilage or synovial joint tissue of patients with progressing osteoarthritis (OA), the cellular Senescence-Associated Secretory Phenotype (SASP) has been identified. Oxidative stress is thought to encourage articular chondrocyte apoptosis or articular cartilage destruction. It is defined by an excessive build-up of Reactive Oxygen Species (ROS) and an imbalance in the energy metabolism of articular chondrocytes. Moreover, OA is encouraged by age-related inflammation within the synovial joint, which is likewise linked to SASP and causes detrimental alterations in the articular cartilage's Extracellular Matrix (ECM).

An additional significant risk factor that raises the incidence of osteoarthritis of the hip and knee. It has been demonstrated that cytokines such as TNF- α , IL-1, IL-6, and IL-8 cause joint inflammation, which in turn causes cartilage degradation and ECM disintegration. Female OA patients were found to have weaker articular cartilage, significant physical joint mobilities, increased amount of joint inflammation but also clinical pain, and more. d. According to recent research, damaged joints have a five times risk of developing osteoarthritis (OA) compared to unharmed joints. Compared to non-professional sportsmen and the general population, professional athletes participating in high-impact sports had a higher incidence of early-stage osteoarthritis [8].

Many people with osteoarthritis think their joint pain is affected by the weather, while the association between OA pain and weather conditions is still unclear. Weather conditions appear to be associated with OA pain. Barometric pressure and relative humidity were positively correlated to OA pain intensity, while temperature was negatively correlated to OA pain [13].

Differential Diagnosis

osteoarthritis shows similar features to various disorders like rheumatoid arthritis, septic arthritis, gout, psoriatic arthritis, ankylosing spondylitis, lupus, chondromalacia patellae, joint infections, etc so it's important to rule out these diseases to form the final diagnosis of OA [14].

Investigations

Diagnosing Osteoarthritis (OA) is a frequent ailment that is determined by a combination of imaging scans, examination, medical history, and occasionally laboratory tests. The diagnostic also makes use of medical imaging technologies such as Magnetic Resonance Imaging (MRI), computed tomography (CT), and X-rays. CT, morphological examination of the skeletal structure can be performed. Without the need for ionizing radiation, MRI can also be used to see bone and soft tissues, including cartilage. Blood testing could help identify other illnesses and study physiological and biochemical states that might be causing the joint-associated discomfort. Additionally, joint fluid testing is used to rule out or confirm Osteoarthritis (OA) and to discover other disorders that are frequently linked to inflammation of the joints. It's crucial to remember that the information below is meant just as general guidance; for an accurate diagnosis, a healthcare provider should be consulted [9].

X-Ray Findings in OA

The main X-ray findings in Osteoarthritis (OA) of the knee typically include specific changes in the joint structure. Here are the key radiographic features commonly observed in OA knee [15]

- **Joint Space Narrowing:** Progressive loss of cartilage in the joint leads to reduced joint space. X-rays can show a narrowing of the space between the bones (femur and tibia) in the affected knee.
- **Osteophyte Formation:** Osteophytes, or bone spurs, are bony outgrowths that form around the edges of the joint where cartilage has worn away. These can be visualized on X-rays and are a hallmark of osteoarthritis.
- **Subchondral Sclerosis:** Increased density or hardening of the subchondral bone (bone just beneath the cartilage) is known as subchondral sclerosis. This is often seen as a result of the chronic stress on the joint.
- **Alignment Changes:** Changes in the overall alignment of the knee joint may be observed, affecting the normal mechanical axis. This can contribute to abnormal loading and increased stress on certain areas of the joint.
- **Subchondral Cysts:** Fluid-filled cysts may develop within the bone beneath the cartilage. These subchondral cysts are visible on X-rays and are associated with degenerative changes in the joint.
- **Marginal Osteophytes:** Osteophytes can also form along the margins of the joint surfaces. These are often seen as bony projections and contribute to joint deformity.
- **Varus or Valgus Deformity:** Progressive OA can lead to changes in the alignment of the knee joint. Varus deformity involves the inward angulation of the joint, while valgus deformity involves outward angulation. These deformities can be observed on X-rays.

Why Do Adults Go to the Gym?

Adults go to the gym for a multitude of reasons, ranging from the pursuit of physical fitness and health improvement to specific goals such as weight management and strength building. For many, the gym serves as a convenient and structured environment that offers access to a variety of exercise equipment and facilities. Engaging in regular workouts at the gym can contribute to cardiovascular health, muscle strength, and overall well-being. The social aspect of the gym, including group classes and workout partners, provides a sense of community and motivation. Additionally, stress relief and the release of endorphins during exercise are factors that draw adults to the gym, contributing to improved mental health. Personal achievements, such as reaching fitness milestones or setting and

attaining specific goals, also play a significant role. Whether driven by a desire to prevent diseases, enhance mobility, or simply enjoy a recreational activity, adults find the gym to be a versatile space that accommodates a wide range of fitness objectives.

Adults with Osteoarthritis (OA) often Choose to Engage in Gym Activities for Several Reasons, Recognizing the Potential Benefits of Exercise in Managing their Condition

- **Joint Function and Mobility:** Preservation of Joint Function: Regular exercise, particularly in a controlled environment like a gym, helps maintain and improve joint function. Targeted exercises can enhance mobility and prevent further stiffness, which is crucial for individuals with OA.
- **Pain Management:** Strength and Stability: Strengthening the muscles around affected joints provides additional support and stability, potentially reducing pain associated with OA. Specific exercises, when performed correctly, can alleviate joint stress and enhance overall joint health.
- **Weight Management:** Reduction of Joint Load: Weight management is crucial for individuals with OA, especially in weight-bearing joints. Going to the gym allows them to engage in cardiovascular exercises and strength training, contributing to weight control and reducing the load on affected joints.
- **Improved Mental Well-Being:** Stress Reduction: Engaging in regular exercise is known to promote mental well-being. Adults with OA may experience stress and anxiety related to their condition, and the gym provides an opportunity for stress relief and mood enhancement through the release of endorphins.
- **Social Support and Motivation:** Community Engagement: Gyms often offer a supportive community where individuals can share experiences and motivation. Participating in group classes or workout sessions with others can provide encouragement and a sense of camaraderie.
- **Enhanced ROM:** Flexibility Training: Incorporating flexibility exercises in a gym routine can help improve and maintain the range of motion in joints affected by OA. This is essential for daily activities and functional independence.
- **Adapted Exercise Program:** Tailored Workouts: Many gyms offer programs or trainers who can tailor exercise routines to accommodate the specific needs and limitations of individuals with OA. This ensures that exercises are safe, effective, and appropriate for their condition.
- **Long-Term Health Benefits:** Disease Management: Regular physical activity is associated with overall health benefits. For individuals with OA, engaging in exercise can contribute to better disease management, potentially slowing the progression of the condition.

Individuals with OA need to consult with healthcare professionals or physiotherapists before starting a gym regimen. They can provide guidance on suitable exercises, intensity, and modifications based on the severity and specific characteristics of the OA. Overall, going to the gym can be a proactive and empowering choice for managing OA symptoms and improving overall health and well-being.

Importance of Gym Exercises in OA

Research and evidence consistently support the positive impact of regular exercise, including gym activities, in managing symptoms and improving the quality of life for individuals with OA. Exercise can help maintain joint flexibility, strengthen supporting muscles, and reduce pain. While exercise is valuable for OA management, preventing the development of OA or quantifying the specific

number of cases prevented by gym activities is challenging due to the multifactorial nature of OA development.

- **Prevention through Exercise**
 - o Regular exercise, including activities performed at the gym, is associated with a lower risk of developing OA, particularly in weight-bearing joints like the knees.
 - o Exercise contributes to maintaining a healthy weight, which is crucial for reducing the load on joints and preventing OA.
- **Improvement in Symptoms**
 - o Numerous studies have shown that exercise is effective in improving symptoms and functional outcomes for individuals with OA.
- **Individual Variability**
 - o The impact of exercise on preventing or managing OA varies among individuals based on factors such as genetics, lifestyle, overall health, and adherence to exercise programs.
- **Population-Level Data**
 - o While there is evidence supporting the benefits of exercise for OA, comprehensive population-level data specifying the number of cases prevented or recovered through gym activities are not readily available [3,16,17].

The decision for individuals with Osteoarthritis (OA) to engage in gym activities can be influenced by the stage of OA, but it's important to note that specific guidance may vary based on individual cases. Clinical recommendations often emphasize the importance of exercise for OA management. Here are general considerations based on existing evidence

• Early Stage (Mild OA)

Evidence suggests that exercise is beneficial even in the early stages of OA. A systematic review published in the Journal of Clinical Rheumatology found that exercise, particularly aerobic and strength training, can improve physical function and reduce pain in patients with knee OA, regardless of disease severity. Another study published in the Journal of the American Academy of Orthopaedic Surgeons emphasizes the role of exercise therapy as a cornerstone in the management of early knee OA [18,19].

• Moderate Stage (Moderate OA)

For moderate OA, low-impact exercises are often recommended to minimize joint stress. A study published in the Journal of Orthopaedic & Sports Physical Therapy found that a supervised exercise program, including low-impact activities, improved pain and function in individuals with moderate hip OA. Guidelines from the American College of Rheumatology and the Arthritis Foundation recommend a combination of aerobic, resistance, and flexibility exercises for individuals with knee and hip OA, even in the moderate stages [20,21].

• Severe Stage (Advanced OA)

In advanced OA, exercise modifications may be necessary to accommodate joint limitations. However, gentle exercises can still be beneficial. A study published in the Journal of Rheumatology found that a home exercise program improved physical function and decreased pain in patients with advanced knee OA. The Osteoarthritis Research Society International (OARSI) guidelines suggest exercise therapy as a core treatment for hip and knee OA, highlighting the importance of individualized exercise programs based on disease severity [18].

The impact of going to the gym on knees in patients with osteoarthritis (OA) depends on various factors, including the type of exercises performed, individual conditions, and proper guidance. In general, appropriate exercise is considered beneficial

for individuals with OA as it helps improve joint function, reduce pain, and maintain overall health. However, it's crucial to be cautious and choose exercises that are joint-friendly to avoid exacerbating symptoms.

Low-impact exercises are generally recommended for individuals with knee OA to minimize stress on the joints. These may include activities such as swimming, stationary cycling, and walking. Strength training exercises that focus on building the muscles around the knee can also be beneficial for providing support and stability. Conversely, high-impact activities or exercises that involve repetitive, jarring movements may pose a risk of aggravating knee pain and accelerating joint degeneration. It's important for individuals with OA to avoid exercises that cause pain, swelling, or discomfort and to consult with healthcare professionals or physical therapists before starting a new exercise program.

Additionally, proper warm-up and cool-down routines, along with using correct form during exercises, are crucial to prevent injury and reduce the strain on the joints. Some individuals may benefit from working with a certified fitness professional who has experience in designing exercise programs for individuals with OA,

Going to the gym can be beneficial for individuals with knee OA, it's essential to choose exercises wisely and tailor the workout routine to the specific needs and limitations of the individual. Consulting with healthcare professionals and seeking guidance from qualified fitness experts can help ensure a safe and effective exercise plan for those with osteoarthritis

Contraindications

While exercise is generally beneficial for individuals with osteoarthritis (OA), there are specific cases where certain gym activities might be contraindicated. It's important to note that individual responses to exercise can vary, and the following examples highlight situations where caution or avoidance of certain exercises is recommended based on existing evidence and clinical guidelines

- **Acute Flare-Ups and Inflammation:** During acute flare-ups of osteoarthritis, intense or high-impact exercises may exacerbate joint inflammation and pain. The American College of Rheumatology advises against vigorous weight-bearing exercises during acute inflammatory episodes [20].
- **Advanced Joint Damage:** Individuals with advanced joint damage, particularly those with significant joint deformities or limited range of motion, may need to avoid certain weight-bearing exercises that can further stress compromised joints.
- **Joint Instability:** Severe joint instability is a concern, as certain exercises may exacerbate instability and increase the risk of falls or injuries. For instance, individuals with knee instability may need to avoid exercises that involve sudden pivoting or twisting movements [22].
- **Post-Surgery Recovery:** After joint replacement surgery, particularly in the early stages of recovery, individuals may need to follow specific guidelines regarding exercise intensity and types of activities. High-impact exercises that strain the replaced joint may be contraindicated during the initial recovery period.
- **Frailty and Balance Issues:** Older adults with osteoarthritis who experience frailty or balance issues may need to avoid exercises that challenge balance excessively, as these could increase the risk of falls [23].

- **Concomitant Medical Conditions:** Individuals with osteoarthritis often have other medical conditions. For example, those with cardiovascular issues may need to be cautious with high-intensity exercises. It's important to consider the overall health profile of the individual when designing an exercise program

Adults with Pre-OA Symptoms or Early Stages of OA are Recommended to Perform Various Gym Exercises

Exercise is crucial to managing osteoarthritis (OA), helping improve joint function, reduce pain, and enhance overall well-being. Below are exercises commonly recommended for adults with OA, supported by clinical evidence. However, it's essential to note that individualized guidance is crucial, and these exercises should be adapted based on individual conditions and preferences [5,24,26].

Flexibility Exercises

1. **Quadriceps Stretch:** Helps maintain flexibility in the front thigh muscles
2. **Calf Stretch:** Enhances flexibility in the calf muscles

Strengthening Exercises

1. **Leg Press:** Strengthens quadriceps, hamstrings, and glutes.
2. **Hip Adduction/Abduction:** Strengthens hip muscles and improves joint stability.
3. **Leg Extension:** targets quadriceps muscles.

Low-Impact Aerobic Activities

1. Walking
2. Stationary cycling
3. Swimming

Core Strengthening

1. Plank

Adults with Later Stages of OA are Recommended to Perform Various Exercises

For individuals in advanced stages of osteoarthritis (OA), exercising in the gym should focus on gentle movements that help maintain joint function and overall health without exacerbating pain or causing further damage. It's crucial to consult with healthcare professionals, particularly physical therapists, for personalized guidance. Below are exercises commonly recommended for adults with advanced stages of OA, considering joint limitations and the need for low-impact activities [5,17,19,25,26].

Gentle Range of Motion Exercises

- **Leg Swings:** Gentle swings forward and sideways while holding onto a support. Helps improve hip flexibility and range of motion.
- **Heel Slides:** Lying on the back, slide one heel along the floor toward the buttocks. Promotes knee flexibility without weight-bearing.
- **Shoulder Rolls:** Slow circular movements of the shoulders. Enhances flexibility and reduces stiffness.

Low-Impact Strength Exercises

- **Seated Leg Press:** Using a leg press machine in a seated position with minimal resistance. Strengthens leg muscles with reduced joint impact.
- **Seated Row Machine:** Targets the muscles of the upper back. Promotes upper body strength without stressing weight-bearing joints.

Functional Movements

- **Assisted Squats:** Holding onto a stable support, perform partial squats to maintain lower body strength. Focus on form and control.
- **Chair Exercises:** Seated leg lifts, knee extensions, and arm exercises using a sturdy chair for support. Enhances muscle strength with reduced strain on joints.

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