

Aquatic Exercise for Individuals with Knee Osteoarthritis

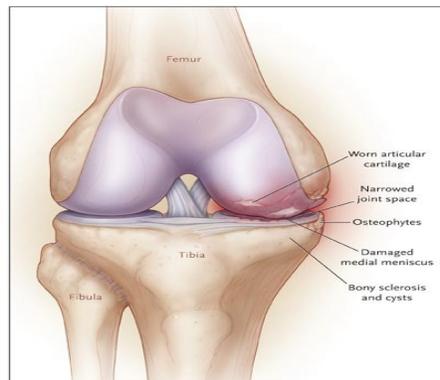
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INTRODUCTION

Knee Osteoarthritis

Osteoarthritis of the knee is described as a chronic degenerative disease that involves inflammation and/or loss of cartilage of the three compartments of the knee joint. The knee joint is where the tibia and end of the femur are covered in smooth articular cartilage. OA of the knee can be the result of obesity, trauma, strenuous activity and/or other modifiable or nonmodifiable risk factors. Clinically it is associated with deformity, stiffness, pain, and the decreased ability to bear weight on the knee joint. Together these symptoms develop into a loss of functional capacity. An estimated 10% of the population over the age of 60 years are affected by knee osteoarthritis. Approximately 80% of this population have restriction with movement and 25% have functional limitations due to inflammation that negatively affects the performance of activities of daily living.



Aquatic Exercise

The principles of the water allow aquatic exercise to be a beneficial alternative to weight bearing and other difficulties associated with land training.

- Buoyancy decreases joint loading and the impact of force during walking & exercise.
- Neck depth water decreases body load to 10% of body weight.
- Chest/waist high water depth decreases body load to 25-50% of body weight.
- Water temperature and hydrostatic pressure result in an increased sensory input that effectively decreases joint pain.
- Drag provides a resistance to the extremities during movements which results in a greater metabolic cost due to enhanced muscular effort.
- These properties of the aquatic environment can successfully maintain or improve range of motion while reducing pain.

EXERCISE RECOMMENDATIONS

Aquatic Interval Training

Interval training consisting of a 3 minute work: 1:30 minute rest cycle focused on lower extremity mobility. Results allow for an increased ability to perform activities of daily living such as stair climbing, bending over, standing balance, and reaching for objects.

- Increased Knee Flexion
- Increase Quadriceps Strength
- Increase Functional Reach Test
- Improved Balance Measured by Sit to Stand Test

Aquatic Strength-Based Mobility Training

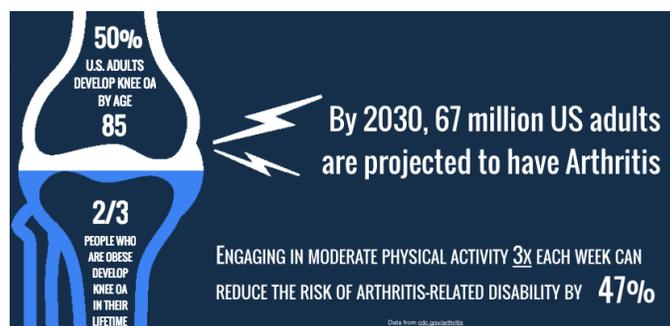
Progressive aquatic strength training that includes lower body strength for the hips, knees and ankles as well as incorporating closed kinetic chain and multidirectional walking exercises. Results allow for an increase in quality of life, physical activity level, and the ability to avoid obstacles while ambulating.

- Reduction in Pain
- Improved Muscular Strength
- Improved Muscular Power
- Improved Gait Performance Measured by the 6-Minute Walk Test

Aquatic Aerobic Training

Water walking as well as shallow-water aerobics lasting 30-60 minutes. Results allow for increased physiological and psychological health as well as cardiovascular improvements.

- Decreased Triglyceride Levels and Total Cholesterol
- Increased HDL Levels
- Decreased Pain
- Decreased Depression
- Increased Self-Efficacy
- 10% Increase in VO₂ Peak Values



CONCLUSION

Aquatic exercise allows people living with knee osteoarthritis to reduce pain and other symptoms, maintain or regain functional capacity, and increase physical activity levels and quality of life. Several studies have included strengthening, mobility, aerobic exercises along with interval training to improve functional capacity. According to these studies, exercise prescriptions including any of these programs, combined or separate, for an average duration of 8-12 weeks should increase the quality of life and activities of daily living in people with knee osteoarthritis.

Exercise Prescription for Knee Osteoarthritis 10-week Program

VARIABLE	MUSCLE GROUP	EXERCISE (buoyancy or weighted)	DURATION
Strength	Quadriceps Hamstrings Hips	Quad Extension Hamstring Curl Hip Flex/Ext/Abd/Add	3 min each
Mobility	Hip Flexors Hip Extensors Hip Adductors Hamstrings Quadriceps Gastrocnemius/Soleus	Noodle Push Down Noodle Assisted Wall Assisted	2 min each 30 sec each x2
Gait & Aerobic Exercise		Forward Walking Backward Walking Side-to-Side Stepping Walking March/Heel High Walking	3 min each
Balance & Stability	Hip Abd/Adductors Gastrocnemius/Soleus Plantar Flexors	Single Leg Stance Single Leg Calf Raise Tandem stance Step Up Hold	2 min per leg x2

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SAMPLE WORKOUT

Osteoarthritis of the knee is a chronic degenerative disease that causes inflammation and loss of cartilage in the joint. This can be caused by obesity, trauma, and strenuous activity. Knee osteoarthritis causes stiffness, pain, and the inability to bear weight on the knee joint. These symptoms eventually lead to a loss of functional capacity. The properties of the aquatic environment decrease joint loading, increases sensory input, reduces joint pain, provide resistance, and can help increase range of motion of the knee joint.

EXERCISE	EXPLANATION	TIME
Warm-Up	Forward walk across the pool. Add lateral, tandem and backward gait to help with balance.	10 minutes
Hamstring/ IT Band Stretch	Stretching before a workout is recommended; pool noodle can be used.	2 minutes
Quadriceps Stretch	Stretching of the lower extremity is recommended.	2 minutes
Calf Stretch	Stretching of the lower extremity is recommended.	2 minutes
Leg Push Down with Noodle	Position noodle under one foot; push the noodle toward the pool bottom (extending the knee and hip) and release to start position. Improves balance and strength.	4 minutes (2 minutes each leg)
Squat	Low impact exercise useful for strengthening the lower extremity.	3 minutes
Lunge	Low impact exercise useful for strengthening the lower extremity.	4 minutes (2 minutes each leg)
Aerobics Segment of Workout		
Jumping Jack	Focuses on increasing muscle extension and cardiovascular endurance.	3 minutes
Bicycle, Suspended with Noodle		3 minutes
Kick Front, Back, and Side	Self-efficacy and pain levels are improved with these types of exercises.	4 minutes (2 minutes each leg)
Leg Curl		2 minutes
Cross-Country ski		3 minutes
Rocking Horse		4 minutes (2 minutes each leg)
Jogging with Direction Change		5 minutes
Cool-Down	Forward and backward gait, marching, and stretching of the lower extremity.	10 minutes