Should Golfers Do Strength Exercise?

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Golf is a very popular physical activity that appeals to men and women of all ages. Unlike many faster-paced sports that involve mostly teenagers and young adults, golf is the exercise of choice for many middle-agers and seniors. Because 18 holes of golf is a fairly time-consuming activity, it is particularly well-suited to retired persons.

Actually, a few hours of golf involve only a few minutes of demanding exercise, namely the forceful swinging action of the drives. Although brief, the explosive nature of the golf swing places considerable stress on the hip, back and shoulder joints, which may lead to a variety of injuries. It would therefore seem important for golfers to perform some stretching and strengthening exercises to condition their musculoskeletal system and reduce the risk of swing-related injuries. Obviously, pre-season preparation becomes a more critical concern for older golfers who have lower levels of muscle strength and joint flexibility.

While golf may be a captivating and satisfying activity, it has essentially no value in terms of fitness enhancement. And although there are certainly exceptions, it would appear that the majority of golfers are not exercise enthusiasts. Generally speaking, most golfers could benefit from regular participation in an appropriate exercise program.

Strength Training Misconceptions

Unfortunately, golfers have traditionally avoided those activities that are most useful for muscle strengthening and injury prevention. For years, golfers have shunned all forms of strength exercise for fear that it would reduce their joint flexibility and decrease their movement speed (7). Of course, there are many other myths that have scared golfers and other adults away from strength training. Leading misconceptions are that strength exercise increases bodyweight and blood pressure readings. Both of these assumptions are categorically untrue.

Strength Training Benefits

Research clearly demonstrates that properly-performed strength training significantly improves both body composition and blood pressure (1, 3, 12). In fact, sensible strength exercise has been shown to replace muscle (1, 12), increase metabolism (1), build bone density (8), reduce low back pain (9), decrease arthritic discomfort (11), improve glucose metabolism (4), accelerate gastrointestinal transit (6), and enhance blood lipid profiles (5, 10). Strength training has clearly been shown as an effective deterrent to many of the degenerative problems that accompany the aging process (2).

Strength Training and Golf Driving Performance

There is even evidence that a basic program of strengthening and stretching exercises produces a more powerful golf swing. In the summer 1995 issue of *Nautilus Magazine*, I reported the results of a preliminary study in which a small group of golfers performed 15 Nautilus exercises and six stretches, three days a week, for a period of eight weeks. At the completion of the training period, the participants recorded significant improvements in their golf driving power. Their maximum club head speed increased 6 percent (5 miles per hour), even though they did not practice golf during the two-month study period. Golf Study

We have subsequently conducted a larger-scale study using the same conditioning program. By means of a newspaper article and an evening seminar featuring a golf professional, a stretching expert, and a strength training enthusiast, we convinced 17 serious golfers (13 males and 4 females) to participate in the eight-week exercise program.

All of the strength exercises were performed on Nautilus machines, and included leg extensions, leg curls, leg presses, chest crosses, chest presses, super pullovers, lateral raises, biceps curls, triceps extensions, back extensions, abdominal curls, neck flexions, neck extensions, weight-assisted chin-ups, and weight-assisted bar dips. The participants performed each exercise for one set of 8 to 12 repetitions, and added approximately 5 percent more resistance whenever 12 repetitions were completed. Working in a circuit training protocol, the subjects required less than 30 minutes to complete the strength exercises.

All of the stretching exercises were performed on the StretchMate apparatus, and involved six stretches specific to the hip, trunk, and shoulder areas. Each stretched position was held for at least one minute. The six stretching exercises were completed in less than 10 minutes, making the total training time approximately 40 minutes per session.

The subjects of this study (average age 57 years) trained three days per week, and attended 82 percent of their scheduled sessions. They participated in small classes (4 or 5 members each) conducted by the same instructor. It should be noted that the subjects did not practice golf during the course of the study, which took place in Boston during January and February.

Immediately before and after the eight-week training program, each participant's maximum swing speed was carefully assessed by means of a radar monitoring device (Swing Mate by Beltronics). After several warm-up swings, we recorded the average club head speed for five maximum-effort drives into a golf net. We also evaluated each subject for body weight, body composition, muscle strength, joint flexibility, and resting blood pressure.

Study Results

The results of this study were similar to our initial investigation, and were highly encouraging to the program participants. As shown in Table 1, the golfers increased their club head speed by 5 miles per hour. Without even practicing golf, two months of strengthening and stretching exercises produced a 6 percent improvement in their driving power. Because the true test of performance enhancement is on the fairways, we were pleased that the golfers reported consistently longer drives during the 1995 playing season.

Just as important as their increased swing speed, the subjects experienced significant improvements in all of their fitness assessments. As presented in Table 1, they improved their body composition by about 2 percent, lost 3 pounds of fat weight, added 4 pounds of lean (muscle) weight, increased their muscle strength 56 percent, enhanced their shoulder and hip flexibility an average 24 percent, reduced their systolic blood pressure 7 mm Hg and reduced their diastolic blood pressure 3 mm Hg. To say the least, these changes represent impressive fitness improvements from a basic program of strength and flexibility exercise.

Table 1. Changes in club head speed and selected fitness measures for the exercise subjects (N=17).

Variable	Before	After	Change	% Change
Club Head Speed (mph)	82.4	87.4	+5.0*	+6%
Bodyweight (lbs.)	183.9	185.0	+1.1	0%
Percent Fat (%)	24.5	22.9	-1.6*	-7%
Fat Weight (lbs.)	45.3	42.3	-3.0*	-7%
Lean Weight (lbs.)	138.5	142.6	+4.1*	+3 %
Muscle Strength (lbs.)	58.1	90.0	+31.9*	+56 %
Shoulder Abduction (Deg.)	166.6	178.5	+11.9*	+7 %
Hip Flexion (Deg.)	75.8	92.1	+16.3*	+22 %
Hip Extension (Deg.)	18.1	26.1	+8.0*	+43 %
Systolic Blood Pressure (mm Hg)	140.9	133.5	-7.4*	-5%
Diastolic Blood Pressure (mm Hg)	83.2	80.5	-2.7	-3%

* Statistically significant ($p<.01$)

A comparative group of five golfers were tested with the training group, but did not participate in the exercise program. As shown in Table 2, the control subjects did not increase their club head speed nor significantly improve any of their fitness assessments.

Table 2. Changes in club head speed and selected fitness measures for the control subjects (N = 5).

Variable	Before	After	Change	% Change
Club Head Speed (mph)	93.2	93.0	-0.2	0%
Bodyweight (lbs.)	166.5	167.0	+0.5	0%
Percent Fat (%)	19.5	19.6	+0.1	0%
Fat Weight (lbs.)	32.1	32.6	+0.5	+1%
Lean Weight (lbs.)	134.3	134.4	+0.1	0%
Muscle Strength (lbs.)	not assessed in control subjects			
Shoulder Abduction (Deg.)	175.8	175.8	+3.0	+2%
Hip Flexion (Deg.)	95.2	99.0	+3.8	+4%
Hip Extension (Deg.)	22.6	26.2	+3.6	+16 %
Systolic Blood Pressure (mm Hg)	129.6	123.4	-6.2	-5%
Diastolic Blood Pressure (mm Hg)	81.2	78.2	-3.0	-3%

(None of the control group changes were statistically significant at $p<.01$)

Study Implications

The results of this study reveal that golfers may benefit in many ways from a simple program of strength and flexibility exercise. The 40-minute training session consisting of 15 Nautilus exercises and 6 StretchMate stretches produced greater strength, greater flexibility, and greater driving power. This makes perfect sense when we consider the power formula. Performance power equals movement force times movement distance divided by movement time. Additional strength increases the movement force and additional flexibility increases the movement distance, both of which improve performance power.

Performance Power = Movement Force X Movement Distance

Movement Time

Perhaps more important, if golfers understand that strength training is a golf-enhancing exercise, they may be more inclined to perform this life-enhancing activity. As a generally sedentary group, golfers lose about six pounds of muscle every decade, which leads to a variety of degenerative processes (2). Regular strength exercise can replace lost muscle and prevent many related problems, such as obesity and osteoporosis.

It is interesting to note that golfers may not recognize poor physical function until they begin to function better. Many of the program participants reported feeling more energetic and less fatigued during their golf games. Some were amazed at how much more they enjoyed playing golf after completing the conditioning program.

Of course, injury prevention is a critical concern for golfers of all ages, and especially those in their senior years. Although we did not conduct an in-depth injury analysis, none of the program participants reported any golf-related injuries during the 1995 season. It is logical to assume that the subjects' increased muscle strength and enhanced joint flexibility provided a higher level of injury resistance, and empirical evidence seems to support this contention.

Suggested Strength Exercises

With respect to program design, it may be beneficial to analyze specific strength exercises relative to driving performance. Although simple observation of the golf swing suggests that it is essentially an arm action, this is definitely not the case. In fact, almost all of the power production originates in the large muscles of the legs and hips. As indicated in Table 3, these are the quadriceps (addressed by the leg extension and leg press machines), the hamstrings (addressed by the leg curl and leg press machines), and the gluteals (addressed by the leg press machine).

Table 3. Muscles and machines relevant to the golf swing.

Muscle Groups	Nautilus Machines	Relevance To Golf Swing
Quadriceps	Leg Extension, Leg Press	Power Production
Hamstrings	Leg Curl, Leg Press	Power Production

Gluteals	Leg Press	Power Production
Spinal Erectors	Low Back	Force Transfer
Rectus Abdominis	Abdominal	Force Transfer
Obliques	Rotary Torso	Force Transfer
Pectoralis Major	Double Chest	Swinging Action
Latissimus Dorsi	Super Pullover	Swinging Action
Deltoids	Lateral Raise	Swinging Action
Biceps	Multi-Biceps	Club Control
Triceps	Multi-Triceps	Club Control
Forearms	Super Forearm	Club Control
Neck	4-Way Neck	Head Stability

The power produced by the legs must be transmitted to the upper body, and this force transfer is accomplished by the midsection muscles. These include the spinal erectors (addressed by the low back machine), the rectus abdominis (addressed by the abdominal machine), and the obliques (addressed by the rotary torso machine).

The muscles largely responsible for the swinging action are those that control shoulder joint movements. These include the pectoralis major (addressed by the double chest machine), the latissimus dorsi (addressed by the super pullover machine), and the deltoids (addressed by the lateral raise machine). Because club control is an important factor in a productive golf swing, the arm muscles should also be strengthened. These muscles are the biceps (addressed by the multi-biceps machine), the triceps (addressed by the multi-triceps machine), and the forearms (addressed by the super forearm machine).

Finally, golfers need strong neck muscles to maintain a stable head position and eye focus throughout thedef BMT begin/ dynamic swinging action. All of the neck muscles may be effectively strengthened on the 4-way neck machine.

Summary

Golf is a popular activity with large-scale participation among adults and seniors. Due to misconceptions that strength training may reduce their joint flexibility and restrict their swinging action, golfers have traditionally avoided this activity. Fortunately, recent research reveals that an 8-week program of strengthening and stretching exercises may significantly improve driving performance in seasoned golfers.

Just as important, the 15 Nautilus exercises and 6 stretches greatly enhanced the golfers physical fitness. The program participants recorded significant improvements in body composition, muscle strength, joint flexibility, and resting blood pressure. They also reported feeling more energetic and less fatigued during their golf games. The increased muscle strength that resulted from the strengthening exercises and the enhanced joint flexibility that resulted from the stretching exercises clearly contributed to more performance power and less injury risk. It would therefore appear that golfers should perform regular strength training as part of their golf conditioning program.

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