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Research Article

Seniors Citizen Don't need to be falling Oldies!

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Abstract

By 2030, 1 in 6 people in the world will be aged 60 years or over. The share of the population aged 60 years and over was 1 billion in 2020 and will double (2.1 billion) by 2050. The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million. The current population of India is 1,417,607,455 as of Thursday, April 13, 2023, with an elderly population of about 142 million. Every second, someone age 65 or older suffers a fall. About 25% of falls in elderly lead to life-altering changes, primarily from broken bones or head injury. Falls is one of the common problems faced by elderly population in India and world over. A lot of research is done on factors causing fall and minimizing them, but very little on host factors and what one must to do to prevent them? This article concentrates on human factors only.

The three main physical conditions that contribute to falls: 1. Weak stabilizer muscles in the hip and buttocks, 2. Poor core strength, the epicentre for all movement and adaptability and 3. Balance issues which deteriorate with age and for various other health reasons.

Preventing falls is dependent on "muscle power" a combination of strength and speed to maintain balance and mobility. There is no better way to improve physical mobility than regularly lift weights doing barbell therapy. A thrice-weekly bouts of weight and strength training, or twice weekly for a new starter is also sufficient. Strength building comes with expanding muscle mass. A 70-year-old already has lost a substantial muscle and bone mass over the years of living a sedentary lifestyle, leading to immobility and loss of balance, causing falls due to lack of muscle mass and joint mobility. As we build more connective tissues, we get stronger, our endurance improves, our posture will change, our bone mass increases, mobility will improve, and our cardiovascular system improves. Our mood and self-confidence will also increase exponentially as we improve your stamina and physical appearance. The natural hormones that have been dormant working at a reduced capacity over the years of a sedentary lifestyle now help us to lose fat and become more energetic and vibrant at 70.

This manuscript is based on small primary research on the at-risk senior citizens among UNICEF India retirees and their spouses. A review of available literature on testing the risk of falls and the need to strengthen the conditions that contribute to falls listed in para 1.

Materials & Methods:

This article is based on primary research with group of senior citizen assembler for a reunion. 85 of the 90 individuals (retirees & spouses) aged more than 60 years were included in the study. Eligible total number was 85 (45 Male and 40 Female). A total of 9 (F=5, M=4) only could pass the test done for identifying at the risk of fall. For all demonstration of few key exercises was done and hope to evaluate in the reunion in Goa during March 2024.

Keywords: Muscle power; Core muscles; Stabilizer muscles; sense of balancing; Falls; at risk population; testing the risk; Clam, Bridge; squats and deadlifts to strengthen muscles

Introduction

By 2030, 1 in 6 people in the world will be aged 60 years or over. The share of the population aged 60 years and was 1 billion in 2020 and will increase to 2.1 billion by 2050. The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million [1]. The elderly population of India on 13 April 2023 is about 142 million. The

retiring age for people working in public sector and most private sectors is 60-62years in India. By that time most retirees (more among women than men due to sedentary life and work tension of meeting either timeline or physical and or financial progress) would have already lost a substantial muscle and bone mass over the years due to living a sedentary lifestyle or vehicle dependent commuting. With the advent of digital work and entertainment culture in the last decade TV, Laptop, Desktop and Mobile phones have invade almost all houses. Covid pandemic since late 2019 increased the dependency on digital learning due to lock out and restricted in person education also. Most people sit for hours watching TV, messaging through WhatsApp or E-mails or doing other activities, and eventually all they can do is sit. This has led to immobility and loss of balance, especially among senior citizens causing falls due to lack of muscle mass and joint mobility. Every second, someone age 65 or older suffers a fall. About 25% of falls in elderly lead to life-altering changes, primarily from broken bones or head injury. The three main physical conditions that contribute to falls are: 1. Weak stabilizer muscles in the hip and buttocks, 2. Poor core strength, the epicentre for all movement and adaptability and 3. Balance issues which deteriorate with age and for various other health reasons [2]. Preventing falls is dependent on "muscle power" a combination of strength and speed to maintain balance and mobility. There is no better way to improve physical mobility than regularly lift weights doing barbell therapy. Human development form 4-legged animal to 2 legged, vertically standing posture needs a bit of balancing. Unfortunately balancing depends upon i) Sense of balance, that naturally wanes over time, as do reflexes and coordination. This makes it easier to topple and harder to catch ourselves if we do missteps. ii) Another cause of poor balance is deterioration of the inner ear's vestibular system. It feeds information to the brain about motion, head position, and spatial orientation, and it, too, becomes less effective as we age. iii) Health conditions Like arthritis, peripheral neuropathy involving the feet or lower legs, and heart arrhythmia, vision problems like cataracts, glaucoma, and age-related macular degeneration also contribute to balancing problems. Strength building comes with expanding muscle mass, that start shrinking due to poor use of various muscles due to sedentary life as age advances [3]. By active efforts to build more connective tissues, we get stronger, our endurance improves, our posture will change, our bone mass increases, mobility will improve, and our cardiovascular system improves. Our mood and self-confidence will also increase exponentially as we improve your stamina and physical appearance. The natural hormones that have been dormant working at a reduced capacity over the years of a sedentary lifestyle now help us to lose fat and become more energetic and vibrant at 70 [2]. The question and answer are a good one if you replace the age of 70 with 60, 50, or 40. This article is based on primary research with group of senior citizens assembled for an annual reunion in March 2023. 85 of the 90 individuals (retirees & spouses) aged more than 60 years were included in the study. A total of 9 (F=5, M=4) could pass the test done for identifying at the risk of fall. For all demonstration of few key exercises was done and hope to evaluate in the reunion in Goa during March 2024

This Primary Research:

On 11 March 2023, 90 individuals (An India UN agency retirees and their spouses), were on an evening Cruise. As a part of health tips session, we requested 85 of participants aged 60 years are more for Balancing Test. Only 9(F=5/ 40, M=4/45). Participation was voluntary, people had the option to opt out. Two balancing Tests used were: 1) Placing one foot (toes and heel) in front of opposite thigh and try to stand without losing your balance for up to a minute. Reverse with the other legs in second attempt. Three opportunities were given for each one lagged standing. 2) Another version was to walk heel-to-toe (front legs heel to touch toes of rear leg), like on a tightrope, for 20 steps. Anyone who had trouble maintaining balance and stability with either of these tests was needing help.

Both the tests were demonstrated by the author (male) and two participants (female) who were regular exponents of yoga. They also demonstrated the exercises after the results.

Results:

Age>>> Gender	**60-69 yrs.**	**70-79 yrs.**	**80+ Yrs.**	**Grand Total**
Male	16	28	1	45
Female	16	24	0	40
Total	32	52	1	85

Table 1: Distribution of participants by age & Gender

Age>>> Gender	**60-69 yrs.**		**70-79 yrs.**		**80+ Yrs.**		**Total**	
	TT	**DNT**	**TT**	**DNT**	**TT**	**DNT**	**TT**	**DNT**
Male	15 (94)	1	23 (82)	5	0 (0)	1	38	6
Female	13 (81)	3	20 (83)	4	0	0	33	7
Total	28 (88)	4	43 (83)	9	0	1	71	13

Note: TT= Took test, DNT= Didn't take Test, P Rate = Participation Rate in Parenthesis

Table-2: Distribution of participants by age & Gender who took the tests.

Age>>> Gender	**60-69 yrs.**		**70-79 yrs.**		**Total**	
	TT	**Successful**	**TT**	**Successful**	**TT**	**Successful**
Male	15	10 (67)	23	10 (43)	38	20 (53)
Female	13	8 (61)	20	08 (40)	33	16 (48)
Total	28	18 (64)	43	18 (42)	71	36 (51)

Note: TT= Took test, S Rate = Success Rate in Balancing in Parenthesis

Table-3. Distribution of Outcome of Balancing Tests of participants by age & Gender

As we can see in table nearly 50% were successful in clearing the balancing test, mean half of the participants were at risk of avoidable falls. While nearly 2/3 of participants in 60-69 age group were successful, only 42-43% were able to balance in 70-79 age group, indicating the increasing risk as age advances. The lone participant of 86 years did not take the test as he was on pacemakers and was sure he wouldn't be able to stand on one leg. Six of the participants (4-femle and 2 male) had already tested themselves before joining the session and of them 2 women had failed the test, that is included in the results.

Following the results, following exercises were demonstrated for regular practice to minimize the risk of falling to strengthen Gluteus Muscles in the buttocks. All were alerted to wait 8 weeks or more to feel the benefits:

Strengthen your Gluteus Muscles in the buttocks –Wait 8 weeks or more for feel the benefits:

Figure 1. The clam

1. **The clam:** a simple floor exercise that targets both muscles.

a) Lie on your right side, your left leg on top of your right, and your knees comfortably bent.

b) Keeping your feet together, raise your left knee and the left leg until it makes a 90° angle to the right leg (or as high as is comfortable). Hold for a second (I recommend them to chant Hare Krishna Hare Krishna Krishna Krishna Hare Hare") and slowly return to the starting position. Do eight to 10 repetitions to complete one set. Do two to three sets.

c) Change sides and complete the same number of repetitions and sets with the opposite leg.

For more of a challenge, wrap a resistance band around both legs above the knee.

As the days progress for more of a challenge, they were advised to wrap a resistance band around both legs above the knee.

Figure 2. One-legged standing

2. **One-legged standing**. Stand on one leg for 30 to 60 seconds, using a counter or the back of a chair for support initially if needed. Switch legs & repeat. Go back & forth between the two poses several times.

Figure 3. Bridge

3. **Bridge.** Lie on your back with your knees bent and feet flat on the floor, hip-width apart. Place your arms at your sides. Relax your shoulders against the floor. Tighten your buttocks and abdominal muscles, press your heels into the floor, and lift your hips as high as is comfortable, or until they are in line with your shoulders and knees. Hold for a second. Return to the starting position. Do these eight to 12 times. Rest 30 to 90 seconds and repeat the entire set.

Figure 4. The Squats

4. The Squats: The squat strengthens our glutes, abdominals, and all the big muscles in legs, including the quads (front of your thighs) and hamstrings. Steps to execute:

1.Stand with feet a little wider than hip width, toes facing front.

2. Drive our hips back—bending at the knees and ankles and pressing our knees slightly open

3. Sit into a squat position, still keeping heels and toes on the ground, chest up & shoulders back.

4. Strive to eventually reach parallel, meaning knees are bent to a 90-degree angle.

5. Press into your heels and straighten legs to return to a standing upright position.

Figure 5. Tai Chi

5.Tai chi: Practicing tai chi, the ancient Chinese martial art that consists of slow controlled movements focusing on weight distribution and rotation. Numerous studies have supported its use to improve balance and coordination and reduce fall risk among older adults and others at high risk for falls, like stroke survivors.

Discussions:

The current population of India is 1,417,607,455 as of Thursday, April 13, 2023 [7]. The share & size of elderly population is increasing over time, from 5.6% in 1961 the proportion has increased to 10.1% (males-8.2% & Females 9.0%) in 2021, at an average rate of 0.075% each year. It is expected to reach

13.1% in 2031 [7]. In a total population of 1418 million the elderly population is approaching 142 million in number and is expected to increase to 323 million by 2050. India has the second largest population of elderly people after China. In the geriatric population, fall is the leading cause of nonfatal injuries and hospital admissions. Falls account for 40% of all injury deaths, and the death rates are the highest among 60 years and above in all the regions of the world.

A recent (2022) review report [5] that included observational studies conducted among older adults (aged ≥ 60 years) residing in India, reporting any risk factor for falls as exposure and unintentional fall as the outcome. MEDLINE, EMBASE, PsycInfo, CINAHL, and ProQuest Dissertations were searched until September 24, 2020. Out of the 22 included studies in the systematic review, 12 (out of 18) were cross-sectional studies, two case–control studies, and two cohort studies met more than 70% criteria. The results of this meta-analysis listed the statistically significant risk factors for falls among older adults in 5 categories as i) socio-demographic factors: increasing age, female sex, no formal education, and marital status of single/ widowed/divorced. ii) environmental factors like dim light, iii) lifestyle factors such physical activity and smoking iv) physical and/or mental health conditions like poor balance ‘ abnormal gait, dizziness, arthritis/joint pain/knee pain/osteoarthritis, functional status/ previous disability, coronary artery disease/cardiovascular disease, diabetes, hypertension, difficulty in mobility , vision impairment/cataract, hearing impairment/hearing loss/poor hearing , history of falls, urgency of micturition/incontinence of urine/urinary symptoms, cognitive impairment/dementia/forgetfulness/Parkinsonism, depression, fear of falls, acute medical problem/acute illness of <3 weeks duration, existing morbidity ≥1 and multimorbidity ≥2 v) medical interventions: medicine intake, usage of analgesic medications, for the cardiovascular system and usage of walking aid/stick [5]. Among all the listed causes Visual impairments, Poor balance, abnormal gait, disabilities, verities of joint pains and cognitive impairments were the top six [6].

A systematic search of a few selected studies in 2018 had revealed that the prevalence of fall ranges from 26% to 37% across various regions. The risk of fall was higher among female elderly population compared to male. The major contributing factors for fall injuries are aging, visual impairment, previous history of fall, depression, and gait problem [6].

A small block level study of the 747 elderly contacted for the survey, 140 cases and 140 controls each were selected based on self-reported fall in the previous 12 months. The mean age of the participants was 66 with 95% confidence interval (65-67). Individual risk factors for fall were fear of falling (odds ratio [OR] 6.7) and dizziness (OR 4.9) in 2019 [7]. Therefore, it is now, more than ever, a need to refocus public health priorities for falls prevention in rapidly aging elders in India.

Since our study population was apparently healthy, literate and have access to all health facilities and annual health check-ups, we considered the causes of balancing due to natural aging process, musculoskeletal problems, and Cardio-respiratory problems, that do not restrict exercises. Thirteen individuals who did not take the tests belonged to this category.

Epidemiology of Falls among Elderly:

The most common causes among apparently health people are listed below:

1. Move: Most people as they age grow more sedentary, with the advent of TV, Laptop, Desktop and Mobile phones people sit for hours watching TV or doing other activities, and eventually all they can do is sit. If we want to stay mobile, we need to keep moving. Rarely, sit for more than an hour at a time. Get up and walk around. Move or stop being able to move choice is left to individuals.

2. Stretching: Most people as they age grow stiffer. If you observe older people as they shuffle down the street, they are barely able to bend their legs. Developing a routine that stretches all your major muscle groups several times a week is the only solution. Keep stretching or be Stiff, that’s our choice.

3. Muscles Strengthening: Most people lose muscle mass as they age and deteriorate in strength. Muscles strengthening exercises can be done at home to stay strong. Otherwise, we grow weak.

4. Balance: Most people as they age lose some of their sense of balance which can be dangerous. They trip and fall because they don’t have the balance to recover. Instead, learn balancing exercises like Yoga, Tai Chi, and martial arts. Stay balanced or fall is our choice.

5. Walking. Walking is absolutely the best and most essential exercise anyone can do as they age, can do it anywhere, anytime and for free. Just a good pair of walking shoes and a half hour of time several days a week can do miracles. Walk or stop walking is our choice.

Interventions to Preventing Falls: It is important to have “muscle power” a combination of strength and speed to maintain balance and mobility. The most important thing we can do to maintain mobility and independence as we age, is to exercise that help reduce the risk.

1. Stabilizer muscles: The stabilizer muscles keep you upright and allow you to easily change directions. Two essential stabilizers for fall prevention are the Gluteus Medius (located on the sides of the hip) and the Gluteus maximus (the largest buttock muscle). "They work together and independently to allow us to stand upright and stabilize the back and pelvis as we move during activities. We can strengthen the gluteus Medius and gluteus maximus muscles by Side-to-side leg movements of legs while standing or even sleeping.:

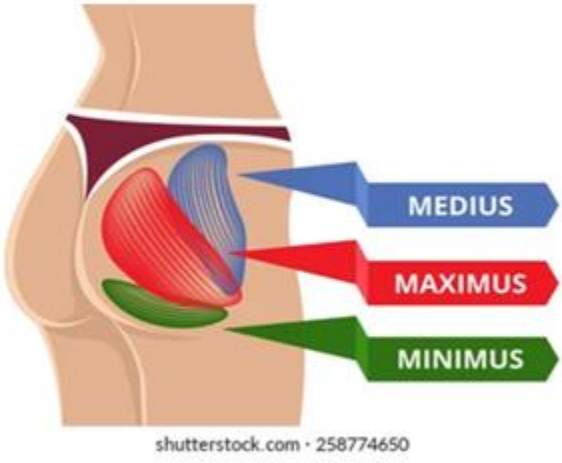

Figure 6: Stabilizer muscles in Human Body

2. Core strength: Core strength is the epicentre from which every movement revolves, "as we walk, our bodies constantly have to adapt to ever-changing ground levels. "Adequate core stability and strength help us better to react to these sudden changes and prevent potential falls. The core consists of several muscle groups -the rectus abdominis ("abs"); the obliques, located on the sides and front of your abdomen; and the transverse abdominis muscles, which lie under the obliques and attach to our spine.

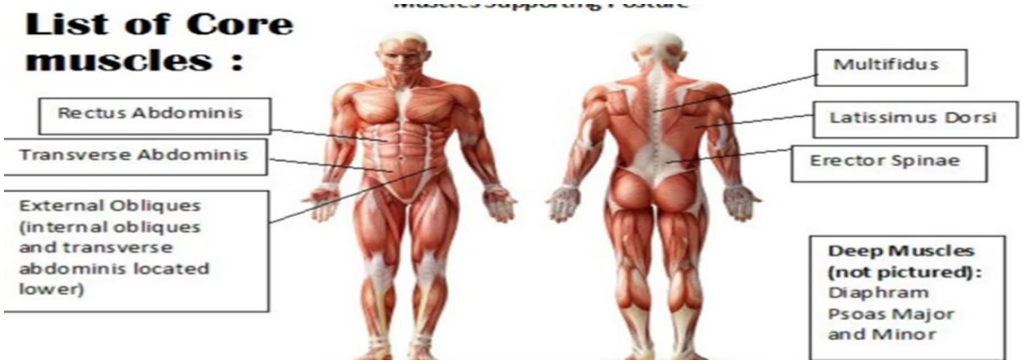

Figure 7. Core Muscles of Human body

3. Balance: i) Sense of balance naturally wanes over time, as do reflexes and coordination. This makes it easier to topple and harder to catch ourselves if we do missteps. ii) Another cause of poor balance is deterioration of the inner ear's vestibular system. It feeds information to the brain about motion, head position, and spatial orientation, and it, too, becomes less effective as we age.

4. Health conditions: Existing health conditions Like arthritis, peripheral neuropathy involving the feet or lower legs, and heart arrhythmia, vision problems like cataracts, glaucoma, and age-related macular degeneration also can contribute to balance problems and the main reasons for the same need to be addressed.

Deadlifts for lower body muscles: After the simple exercises listed for 3-6 months, one can do further muscles strength training. Start with a plan of deadlifts, squats, and overhead pressing variants for the rest of the life. Keep walking every day of the week, year-round. The deadlift is a hip-dominant movement that works the glutes, hamstrings, core, back, and trapezius muscles. They are highly effective at increasing functional strength due to the activation of your largest lower body muscles. They also train you for the functional activity of safely lifting objects off the floor, which is a key skill for day-to-day activities.

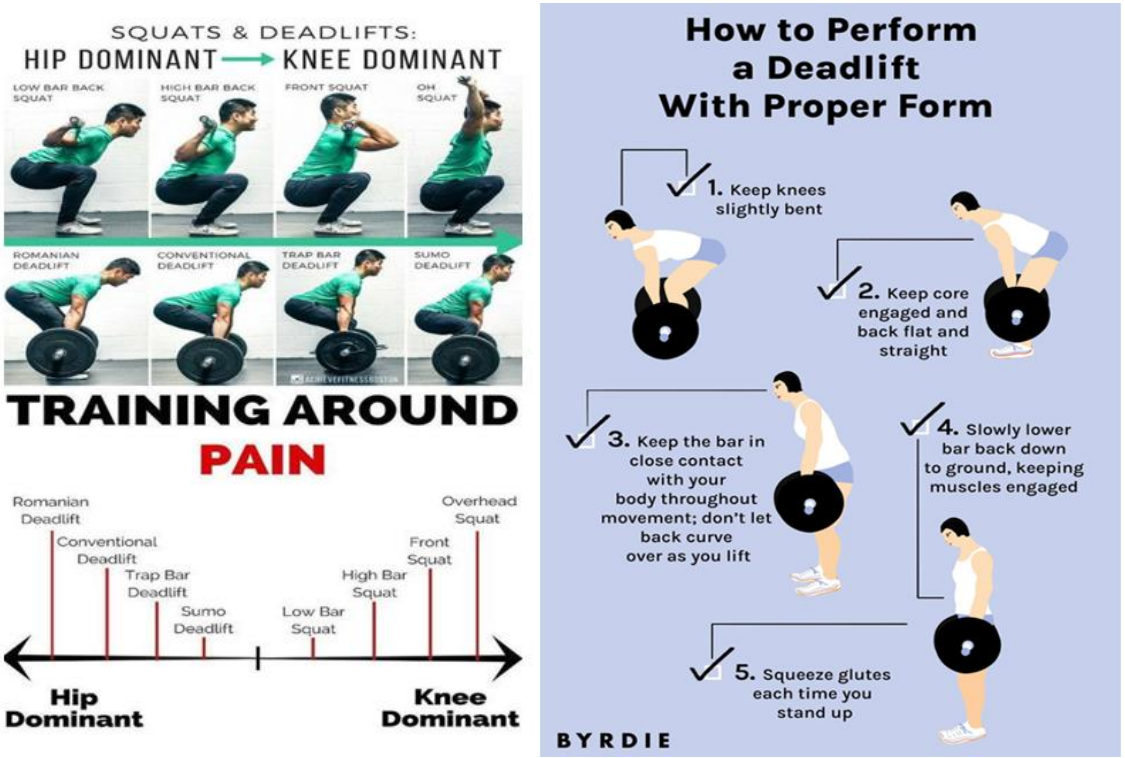

Figure 8. Various Deadlifts

All deadlift exercise variations require us to bend over while maintaining a braced, neutral spine, gripping the weight, and driving through the floor with our feet. The motion uses our glutes, hamstrings, and quadriceps to lift the barbell off of the floor. In the standard deadlift, the initial level change to grasp the bar comes through a combination of hinging at the hips and bending our knees. In a standard deadlift, your torso angle at the beginning of the pull will be roughly 30–45 degrees above horizontal. Throughout the motion, we must keep our core contracted to stabilize our spine and avoid any twisting, rounding, or arching throughout our torso.

Conclusion

By 2030, 1 in 6 people in the world will be aged 60 years or over. At this time the share of the population aged 60 years and over was 1 billion in 2020 and will double (2.1 billion) by2050. The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million. In India we consider population over 60 years as senior citizens. The current population of India is 1,417,607,455 as of Thursday, April 13, 2023, with an elderly population of about 142 million [8,9].

All countries face major challenges to ensure the health especially of elderly and children and women and social systems are ready to make the most of this demographic shift. By 2050, 80% of older people will be living in low- and middle-income countries. Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%.

Falls is one of the common problems faced by elderly population world over. The most common contributing human factors to a slip, trip or fall are - rushing, frustration, fatigue, and being on autopilot. A lot of research is done on factors causing fall and minimizing them, but very little on host factors and what one must to do to prevent them? This article concentrates on human factors only. Seniors should be as active as possible, exercises help us live a longer, healthier life.

As weak muscles, especially in the legs, poor balance, causing unsteadiness on your feet, dizziness or light headedness, black outs, fainting or loss of consciousness, foot problems – including pain and deformities and memory loss, confusion or difficulties with thinking or problem solving are the key challenges, we can solve most of them by building connective tissues. As we build more connective tissues, we get stronger, our endurance improves, our posture will change, our bones mass increases, mobility will improve, and our cardiovascular system improves. Our mood and self-confidence will also increase exponentially as we improve our stamina and physical appearance. The natural hormones that have been dormant working at a reduced capacity over the years of a sedentary lifestyle now help you lose fat and become more energetic and vibrant at 70.

The best way to prevent falls is to stay with a plan of deadlifts, squats, and overhead pressing variants for the rest of your life. The deadlift is a hip-dominant movement that works the glutes, hamstrings, core, back, and trapezius muscles.

Just Keep walking every day of the week and strengthen key stabilizer and core muscles year-round.

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