

## Resistance training with thera-band to reduce effects of sarcopenia in older people

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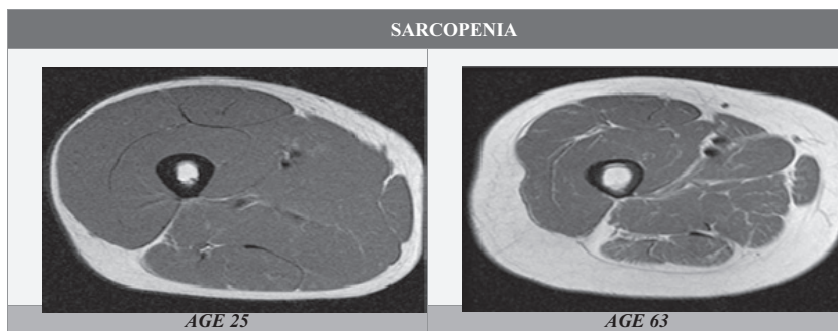
**Resistance training with tera-band to reduce effects of sarcopenia in older people:** Sarcopenia is defined as age-related progressive loss of muscle mass. This loss of muscle mass and the resulting loss of strength and function may lead to a reduced quality and expectancy of life in older people. For this reason, the maintaining of the mobility is a major goal for preservation the health and the independence of the adults. Resistance exercise is generally recommended as preferred approach to attenuate losses of muscle strength, mass, and functional capacity in older adults. Numerous research studies utilizing traditional approaches to resistance training have focused on the development of muscular strength and increased muscle mass to slow or reverse the effects of sarcopenia in adults. Thera-Band resistance training is a relatively new a method for strength exercise in older people. However, the published studies have demonstrated the effectiveness of Thera-Band exercise programs in adults. The results showed significant improvements in "functional fitness" including strength, balance, mobility, and gait speed. In this regard, the review objective is to present an exemplary complex for resistance training with Thera-Band. The complex is aimed to reduce effects of sarcopenia and improving physiological functions in older adults. It includes exercises for major muscle groups met against elastic resistance of the band.

**Key words:** Sarcopenia, Resistance training, Thera - Band

### INTRODUCTION

Successful aging includes storing the ability of older adults to live independent lifestyles and to fully perform their functional tasks and activities of daily living. However, many studies have shown that the aging process is connected to significant losses of functional ability. [9, 18, 21]

The development of the functional disability is directly related to the sarcopenia. Sarcopenia is defined as the progressive loss of muscle mass and strength, which typically seen with increasing age, (**Figure 1**). [18]



**Figure 1.** Image of sarcopenia in older people [18]

Age-related loss of muscle mass and strength leads to functional limitations and physical disabilities among older people. It was found that, engaging in regular physical activity is essential to avoiding sarcopenia, as the inactivity is the major contributing factor to this condition. [13]

For this reason, the maintaining of the mobility is a major goal for preservation independence in older adults. [10]

Regular physical exercise is considered to be an effective strategy for maintaining and promoting health, physical fitness and functional independence in older adults, especially in terms of endurance, muscular strength, flexibility, and balance. [10, 12]

Resistance exercise, as a type of muscle strength training, is generally recommended as the preferred approach to attenuate losses of muscle strength, mass, and functional capacity in adults. [10, 16, 24]

## EXPOSITION

Sarcopenia is derived from the Greek word “sarx” for flesh and “penia” for loss (M.S. John Pathy 2006). It is characterized by a decrease in the size of the muscle, which causes weakness and frailty. The progressive and generalized loss of skeletal muscle mass and strength lead to adverse outcomes such as physical disability, poor quality of life and disability. Age-related loss of muscle mass and strength not only deprives elderly people of the ability to perform the most basic activities of daily living, but also vastly heightens the risk of suffering severe injuries, traumas and even death from sudden falls and other accidents. Although, the loss of muscle mass may be caused by different cellular mechanisms than those which cause muscle atrophy, lack of exercise is currently thought to be a significant risk factor, increasing the likelihood of sarcopenia. [1]

Not only muscle, but the entire musculoskeletal system (bones, muscles, tendons, joint capsules and ligaments), neuromuscular responsiveness, endocrine function, vaso capillary access, depends on regular and lifelong exercise to maintain integrity.

The slow attenuation, muscle atrophy, or loss of muscle tissue age-related, which medical professionals described as sarcopenia (literally, “flesh loss”) is considered as a result of cumulative loss of musculoskeletal strength and mass associated with chronic absence of exercise of sufficient intensity or volume. [4]

For this reason, the maintenance of mobility is a key objective of protecting the health and independence of older people. Exercise and increases in activity have been shown to be beneficial in settings of sarcopenia. Exercise can increase strength and muscle function even in the very old.

Primary therapeutic strategy of sarcopenia is through the application of a graded exercise program, including both cardiovascular and strength component, dosed in such a way as to provoke beneficial adaptation without overloading the weakened body. [24] Possible therapeutic strategies include resistance training and aerobic activity programs, as evidenced by recent studies. Physical activity incorporating resistance training is probably the most effective measure to prevent and treat sarcopenia. Many studies have shown that strength training exercises can increase strength and function in older adults, but few if any have examined effects of Thera-Band resistance training.

However, the studies showed significant improvements in the strength, balance, mobility, and gait speed after application of the resistance training with Thera-Band. [15]

The exercise with Thera-Band elastic bands can help improve reaction time and movement speed in older adults, which may have important implications in reducing injury risk and improving functional performance. [15]

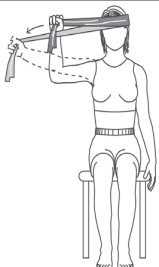
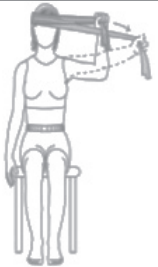
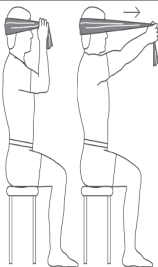
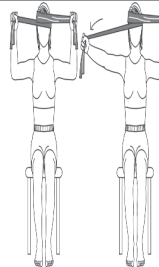
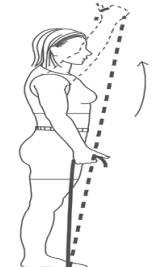
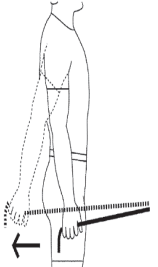
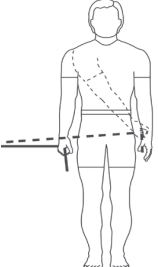
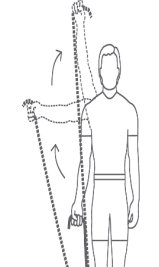
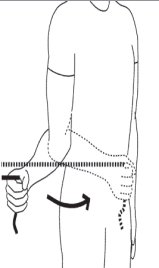
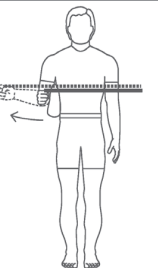
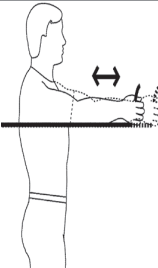
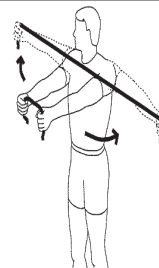
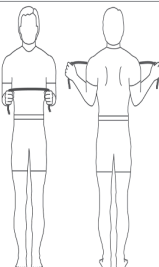
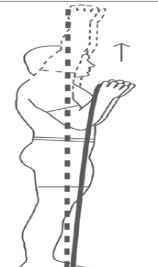
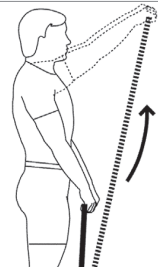
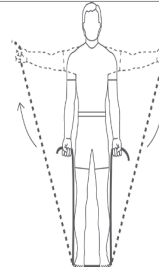
Most common the resistance training with Thera-Band in elderly may contribute to prevent the disability induced by sarcopenia, (**Table 1**). [20]

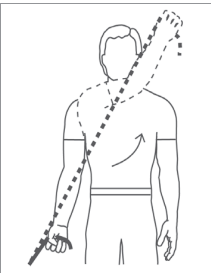
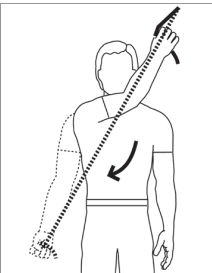
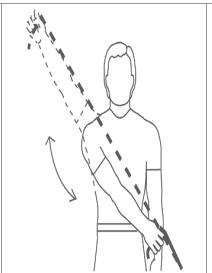
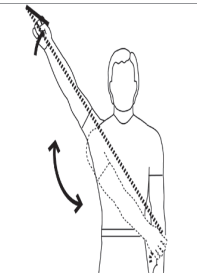
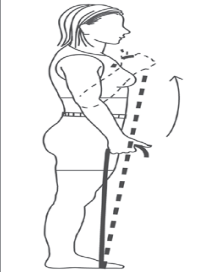
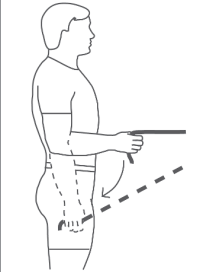
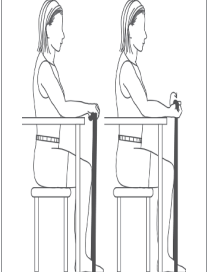
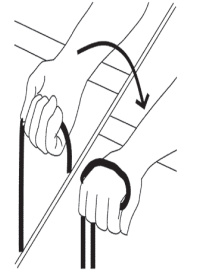
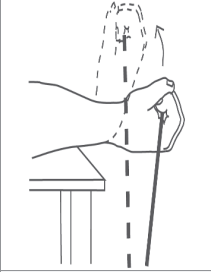
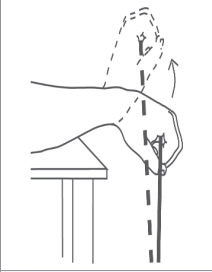
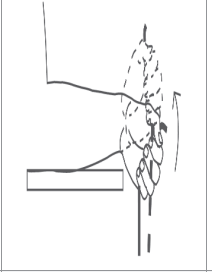
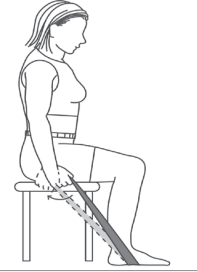

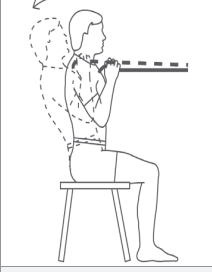
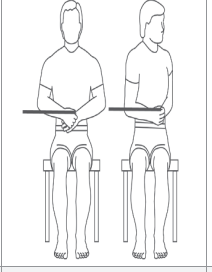
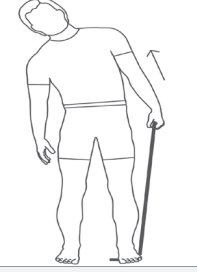
**Table 1.** Effects of resistance exercise therapy on aging [20]


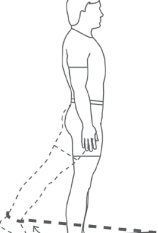
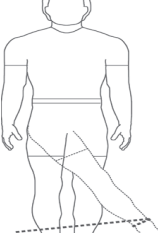
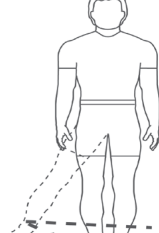
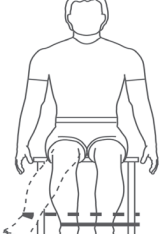
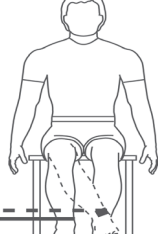



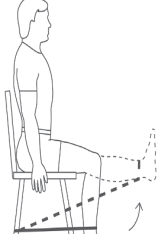
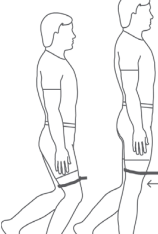
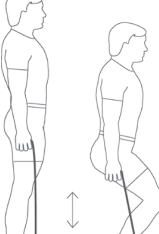
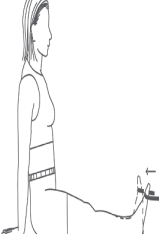
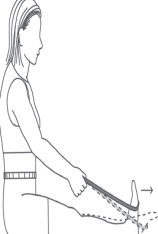
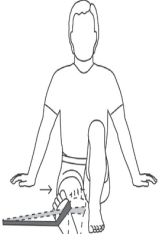
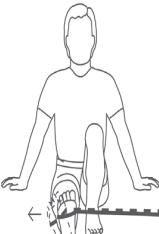
EFFECTS OF RESISTANCE EXERCISE			
INCREASE IN MUSCLE STRENGTH			
<i>HYPERTROPHY OF MUSCLE FIBERS</i>	<i>ANABOLIC AND ANTICATABOLIC EFFECT ON SKELETAL MUSCLE</i>	<i>INCREASE IN TURNOVER RATE OF MYOFIBRILLAR PROTEINS</i>	<i>QUALITATIVE REMODELLING OF FAST-TWITCH FIBERS</i>

In this regard, the purpose of this paper is to present an exemplary complex for resistance training with Thera-Band in adults with sarcopenia (**Table 2**).

*Table 2. Exemplary set of exercises with Thera band [2]*

EXEMPLARY SET OF EXERCISES WITH THERA BAND			
NECK			
			
ISOMETRIC LATERAL FLEXION	ISOMETRIC LATERAL FLEXION	ISOMETRIC EXTENSION	ISOMETRIC ROTATION
SHOULDER GIRDLE			
			
FLEXION	EXTENSION	ADDUCTION	ABDUCTION
			
INTERNAL ROTATION	EXTERNAL ROTATION	HORIZONTAL ADDUCTION	HORIZONTAL ABDUCTION
			
SCAPULAR RETRACTION	OVERHEAD PRESS	FRONT RAISE	LATERAL RAISE

			
<b>DIAGONAL – FLEXION WITH ADDUCTION</b> <b>ДИАГОНАЛ – EXTENSION WITH ABDUCTION</b>		<b>DIAGONAL – FLEXION WITH ABDUCTION</b> <b>DIAGONAL – EXTENSION WITH ADDUCTION</b>	
<b>ELBOW JOINT</b>		<b>RADIO-ULNAR JOINT</b>	
			
<b>FLEXION</b>	<b>EXTENSION</b>	<b>SUPINATION</b>	<b>PRONATION</b>
<b>WRIST JOINT</b>			
			
<b>FLEXION</b>	<b>EXTENSION</b>	<b>RADIAL DEVIATION</b>	<b>ULNAR DEVIATION</b>
<b>TRUNK</b>			
			
<b>FLEXION</b>	<b>EXTENSION</b>	<b>ROTATION</b>	<b>LATERAL FLEXION</b>

HIP JOINT			
			
<i>FLEXION</i>	<i>EXTENSION</i>	<i>ADDUCTION</i>	<i>ABDUCTION</i>
			
<i>INTERNAL ROTATION</i>	<i>EXTERNAL ROTATION</i>	<i>FLEXION (SITTING)</i>	<i>ABDUCTION WITH EXTERNAL ROTATION</i>
KNEE JOINT			
			
<i>FLEXION (SITTING)</i>	<i>EXTENSION (SITTING)</i>	<i>TERMINAL KNEE EXTENSION</i>	<i>SQUAT</i>
ANKLE JOINT			
			
<i>DORSIFLEXION</i>	<i>PLANTARFLEXION</i>	<i>INVERSION</i>	<i>EVERSION</i>

## Methods

Thera-Band (elastic band or elastic tubing) is the original system to provide of progressive resistance. The bands are color-coded according to different levels of resistance. [14]

Thera-Band is used to provide resistance training during exercise. [2, 10]

The complex for resistance training with Thera-Band is aimed to reduce effects of sarcopenia and improving physiological functions in older adults. It includes exercises for the major muscle groups met against elastic resistance of the band.

Resistive exercise is executed in a series according to the area of exercise. Each exercise has a dosage of 6 – 8 repetitions. Between sets for the different muscle groups have three minute rest.

Resistance exercises be implemented in two or more non-consecutive days per week, using a set of 2 – 4 exercises for the individual parts of the body. During the remaining days can be implement programs for aerobic training.

To strengthen of the muscle, the resistance exercises must be done very slowly, throughout the full range of motion in both directions.

This resistive training program aim to improved strength and performance of some functional tasks, such as rising from a chair and gait speed, and there is effect on overall disability or quality of life.

The programs are individualized to ensure they are providing an adequate intensity to increase strength, while reducing the risk of any injuries. Frail or recently ill older people start exercising at a lower intensity and increase their intensity more gradually.

To maximize on the effectiveness of resistive training is recommended long term exercise, since the positive effects of the exercise will be lost after people stop training.

## CONCLUSION

In conclusion, sarcopenia and weakness associated with aging are widespread in the elderly and cause significant damage to health. At the same time they are potentially reversible and relatively easily susceptible to the therapy.

The resistance training with Thera-Band is an important element in the prevention and treatment of sarcopenia.

Thera-Band elastic bands can significantly improve muscle strength in older adults with functional limitation. [7]

Despite the shortage of research in this area, there are convincing evidence supporting the effectiveness of progressive resistance exercise for increase the muscle mass and strength among older adults. [5, 10, 11]

Studies show, that resistance training with Thera-Band can significantly increase the dynamic balance, functional reach and mobility of the elderly. [10, 17]

Has been reported to improvement of the gait, body composition and reduces the symptoms of pain. [8, 10, 14, 23]

Several studies suggest that the resistance training have a favorable effect on many mechanisms associated with disease prevention, health promotion, and daily functioning. [3, 10, 19, 25]

Using of elastic bands can help older adults to increase your strength similar to the effects achieved by more traditional modes of resistance training. [10, 11]

In addition, Thera-Band is an accessible, inexpensive and undersized device. [10]

Therefore, it can be argued that resistance training may serve as a viable preventive strategy for the aged population.

However, the evidence pertaining to Thera-Band exercise to reduce effects of sarcopenia are remains insufficient.

In this regard, is necessary raise awareness about the role of Thera - Band as a major therapeutic factor to improve functional status of the adults suffering from sarcopenia.

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**Докладът е рецензиран.**