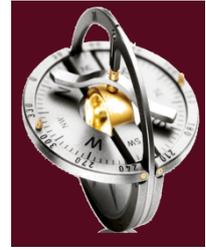


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Editorial

Adequate treatment of nutrition and exercise for elderly people associated with sarcopenia and nutritional disorder

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The importance of exercise has been advocated for years. Exercise is roughly divided into aerobic exercise and resistance exercise [1]. In young people, irregular lifestyle is one of the problems due to various schedules. For the actual efficacy of exercise, the continuation of aerobic exercise for 30 min would be recommended.

On the other hand, what about the elderly? Healthy elderly people with good diet and exercise habits can continue their lifestyle. However, if the subject has sarcopenia or frailty, what is the adequate treatment? [2] In such a case, resistance exercise would be more important than aerobics in order to make strength for their trunk and legs.

The authors have continued various management in the areas of rehabilitation and sports medicine until now [3]. Among them, the target subjects include professional baseball and soccer players, candidates for the Tokyo Paralympics, Masters athletes, high school and college students, healthy elderly people and frail elderly people [4]. As lectures and workshops, we have provided fitness, strength training, masters athletics, pole exercises, stretching, baseball-specific exercises and so on [5]. In this way, we have advised and treated various kinds of exercise therapy so far [6]. In this article, some topics concerning sarcopenia in elderly people would be described.

Among the elderly, there are many subjects probably with sarcopenia and nutritional problems [7]. For treating them, there are four crucial points in the followings. They include I) Strengthen antigravity muscles, II) Be aware of the total workload, III) Continue the exercise plan and IV) Plan to increase protein intake [8]. Along with these outlines, the detail would be described below.

The first is strengthening the antigravity muscles [9]. Muscle atrophy and weakness have been observed along the aging process. This is likely to occur in especially antigravity muscles. The deterioration of these functions leads to poor posture, gait restriction, Activities Daily Living (ADL) restriction and others. Among the antigravity muscles, the most susceptible ones to aging would be large muscle groups near the body surface that contains much amount of type II (fast muscle) fibers. Listed below are included such as the cervical muscle group, trapezius, latissimus dorsi, abdominal muscle group, gluteus medius, gluteus maximus, psoas major and quadriceps femoris muscles.

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In the case of sarcopenia for the elderly, these muscle groups are apt to be influenced to a large extent [10]. Then, performing resistance exercises to these muscles are needed. Among them, the gluteus musculature group and the quadriceps femoris group are especially closely related to basic ADL such as standing, sitting, walking and climbing stairs. It is necessary to maintain and strengthen muscle power through persistent resistance training. As a concrete training method for the gluteus maximus, there are squats, buttocks elevation, stair climbing, ball crushing between thigh and chair and so on. Training methods for quadriceps include repeated standing and sitting, raising the lower limbs when sitting on the chair, and posture of squatting (sitting on the air chairs).

The second is the perspective of the total amount in exercise. When carrying out resistance exercise, it is necessary to set not only the load amount but also the number of repetitions [11]. By the general concept of exercise guidelines, performing resistance exercise can bring the effects of strengthening muscle power and increasing skeletal muscle mass. Its principle has been known that the maximum lifting weight is 70-80% of 1 repetition maximum (1 RM).

In recent years, however, there has been a new theory. Increasing the number of repetitions in resistance exercise with lower load can enhance the reaction of muscle protein synthesis and enhance muscle strength [12].

Consequently, the important point here is the total work out amount obtained by multiplying the load amount and the number of iterations. It has been clarified that the muscle strength is not dependent on the load but is dependent on the total work. For young people, high loads are possible. In contrast, it is difficult for elderly people because a high load seems to be risky. Therefore, in order to perform the resistance exercise safely and effectively, it is recommended to continue the exercise with a large number of repetitions even under lower loading.

The third is the policy of continuous exercise. Since the lasting effect of exercise is temporary, the continuation of exercise is indispensable to maintain the efficacy [13]. In some previous reports, resistance exercise was conducted and then a training break was provided. Resistance exercise for 12 weeks improved muscle strength and skeletal muscle mass [14]. However, the effect was almost halved by the rest of the exercise for 12 weeks. Furthermore, it was revealed that the obtained effect was disappeared after an additional 12 weeks of rest [15]. As described above, the effect has been diminished by the cessation of exercise. During exercise for the purpose of preventing/treating sarcopenia, the continuous exercise would be required, instead of temporary exercise.

The fourth is the need for protein intake. In the youth, the anabolic metabolism of muscle proteins is generally smooth. On the other hand, in the elderly, resistance to the anabolism of muscle proteins has been observed. Both exercise and protein intake are required to improve this resistance [16]. Therefore, the effectiveness of the combined intervention of resistance exercise and protein (amino acid) intake has been advocated. This therapeutic method has also been recommended in the guideline for sarcopenia. As a matter of fact, a substantial mismatch in sarcopenia finding was found in EWGSOP1 and EWGSOP2, in which the prevalence was 27.7% vs 18.1%, respectively [17]. However, all subjects are not necessary to have an additional intake of protein. For the elderly with sarcopenia, resistance exercise would be recommended. In contrast, healthy elderly people often have daily sufficient protein intake, and it is difficult to show the effect of additional protein intake [18]. From mentioned above, the presence or absence of sarcopenia has been firstly screened. After that, check the detail of daily protein intake. Consequently, it may be advisable to consider the additional intake of protein depending on each case. Some cautions are necessary to take additional protein. Protein intake is usually enough at dinner, but it is often insufficient in breakfast and lunch [19]. It is ideal to keep the amino acid concentration in blood high throughout the day. In other cases, to shift protein intake from dinner to breakfast or lunch would be beneficial, leading to a good balance of protein intake.

In summary, elderly people with sarcopenia and nutritional disorders can be managed from these points of view. In response to the various situation of each subject, adequate treatment will be provided with patient-oriented perspectives. This article is expected to become a useful reference in future clinical practice.

Conflict of interest

The authors declare no conflict of interest.

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