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Methods used to assess physical activity in geriatric patients diagnosed with frailty syndrome

Metody stosowane do oceny aktywności fizycznej u pacjentów geriatrycznych z rozpoznanym zespołem słabości

Oliwia Bielik[1], Daria Bieniek[1], Joanna Jakubowska[1], Alina Jaroch[1,2]

[1] Department and Clinic of Geriatrics, Interdisciplinary Scientific Association of Geriatrics, Nicolaus Copernicus University in Toruń, Ludwik Rydygier *Collegium Medicum* in Bydgoszcz

[2] Department and Institute of Nutrition and Dietetics, Nicolaus Copernicus University in Toruń, Ludwik Rydygier *Collegium Medicum* in Bydgoszcz

Abstract

Introduction. *Frailty syndrome is a physical state of exhaustion and tiredness. It usually appears in people over 65 years old, who suffer from various diseases.* ***Aim.*** *The main aim was to present different methods of assessing physical activity among patients with frailty syndrome.* ***Material and methods.*** *Using PubMed and Medline database 22 articles published after 2009 were chosen for this review.* ***Results.*** *Patients performing resistance exercises had greater muscle mass growth in comparison to patients performing aerobic exercises. According to other studies, older people suffering from depression are more exposed to frailty syndrome.* ***Discussion.*** *Physical tests are an efficient method of frailty syndrome detection. They assess the performance of muscles and their flexibility, adherence, the walking speed and patients' endurance.* ***Conclusions.*** *A combination of aerobic and resistance training along with regular workouts is the most effective method of delaying the occurrence of frailty syndrome. (Gerontol Pol 2016, 24, 259-263)*

Key words: *frail elderly, physical activity, geriatric assessment*

Streszczenie

Wstęp. *Zespół słabości to fizjologiczny stan wyczerpania i zmęczenia. Dotyczy najczęściej pacjentów, którzy ukończyli 65 rok życia, cierpiących z powodu różnych innych schorzeń.* ***Cel pracy.*** *Głównym celem pracy było przedstawienie metod oceny aktywności fizycznej w diagnostyce osób cierpiących na zespół słabości.* ***Materiał i metody.*** *Używając baz PubMed i Medline do analizy wykorzystano 22 artykuły opublikowane po roku 2009.* ***Wyniki:*** *Pacjenci wykonujący treningi oporowe wykazali lepsze wyniki w przyroście tkanki mięśniowej, w porównaniu do pacjentów odbywających treningi aerobowe. Według innych badań osoby starsze cierpiące na depresję są bardziej narażone na rozwinięcie zespołu słabości.* ***Omówienie.*** *Testy fizyczną są bardzo dobrą metodą wykrywania zespołu słabości. Oceniają pracę mięśni, ich elastyczność, przyczepność, szybkość chodu oraz wytrzymałość pacjenta.* ***Wnioski.*** *Najbardziej skuteczną metodą opóźniania występowania zespołu słabości jest kombinacja treningów aerobowego i oporowego, a także regularność treningów. (Gerontol Pol 2016, 24, 259-263)*

Słowa kluczowe*: osoby starsze, zespół słabości, aktywność fizyczna, ocena geriatryczna*

Introduction

Frailty is a syndrome of decreased functional reserve and resistance to stressors that results from many impairments across various physiologic systems and causes susceptibility to the occurrence of adverse outcomes [1]. The onset of the frailty syndrome is related to an older age, especially in patients over 65 years old, who suffer from many chronic diseases and need to take various medications [2]. Health condition of frail elderly is connected with biologic and socioeconomic factors. In the context of biological factors, frailty syndrome

Correspondence address: ✉ Alina Jaroch, Department and Institute of Nutrition and Dietetics, Nicolaus Copernicus University in Toruń, Ludwik Rydygier *Collegium Medicum* in Bydgoszcz, 3, Dębowa Str., 85-626 Bydgoszcz, Poland ☎ (+48 52) 585-54-01; 💻 alina.jaroch@cm.umk.pl

is more frequently observed in women and elderly ≥ 75 years old [3]. Among the socioeconomic factors, we can distinguish the place of living, family situation, marital status and education level [4,5]. An extremely important aspect of frailty is the mental state of the patient. Conditions like depression may be a direct cause of eating disorders, causing malnutrition, and in extreme cases anorexia, especially when patients are more exposed to stress factors, which only intensifies the symptoms [6]. Moreover, inflammation of the mouth, missing teeth, and dental prostheses greatly limit the amount of food eaten, as well as its type and consistency, which limits the ability to supply a patient with a balanced diet [7].

To recognize a patient as frail, at least three out of five variables must exist: unintentional weight loss (≥ 5 kg/year), self-reported exhaustion, slowness, weakness and low physical activity [8,9]. It became a significant psychosocial factor, responsible for the progression of many illnesses. A common problem among frail patients is an unintentional weight loss, accompanied by muscle mass loss [10,11]. As the data from scientific literature explains, geriatric patients aged ≥ 75 years old have two times smaller muscle mass and two times bigger fat mass than young, healthy people [12]. Apart from these physiological changes resulting from the process of aging also, the lack of physical activity is responsible for the decrease in muscle mass [13,14]. Unfortunately, patients often do not realize that physical activity greatly prevents from disability and also may reduce the risk of frailty [15]. Therefore, evaluation of frail patients' physical activity through various test and questionnaires is crucial for the implementation of a proper treatment plan, both in terms of exercise and diet.

Aim

The main study objective was to present and compare methods of assessing and enhancing physical activity of geriatric patients diagnosed with the frailty syndrome in order to implement an effective treatment. Secondary study objective was to analyze its connection with depression.

Materials and methods

The literature search was performed using MEDLINE/PubMed database, created by the National Library of Medicine. Keywords used for the search included: "frailty", "frail", "elderly", "depression", "physical activity", "muscle training" and their Polish translations. Randomized clinical trials and high-quality systematic reviews wrote in English and Polish, published in 2009 or later, were included in the analysis. Finally, for the purpose of this research, 22 articles from PubMed database were used, which referred to different aspects of frailty. The main focus was put on physical activity, including both resistance and aerobic training. Moreover, the connection between depression and frailty syndrome was also taken into account.

Results

Physical exercises as a test to evaluate frailty in elderly

To evaluate physical performance of the elderly the most useful are the following tests: 6-min walk, 30-sec arm curl test, 30-sec chair stand test, grip strength, back scratch, chair sit and reach test and also 8 foot up and go test. Each of those tests refers to different aspects of physical activity, endurance, and strength. The 6-min walk is used in the evaluation of aerobic capacity, 30-sec chair stand test in endurance strength of lower limbs, 30-sec arm curl in endurance strength of upper limbs and chair sit and reach test in assessing flexibility [16]. In order to compare the severity of the frailty syndrome in women and men, measurements of physical activity, grip strength and walking speed are helpful. With the use of the aforementioned tests, it is possible to evaluate muscle flexibility, movement speed and the general state of physical activity, both in women and men [17].

Physical activity as an effective treatment of frailty

Frailty is associated with a loss of free fat mass (FFM). However, performing appropriate exercises can stop this loss and even result in the restoration of muscle tissue. The researched literature included a study, which lasted for 9 months and involved 64 participants with diagnosed frailty syndrome or diagnosed as robust. The study participants were performing two kinds of exercises: resistance and endurance training. Researchers concluded that among robust patients, four months of resistance training resulted in a 16 to 23% increase in muscle mass, whereas among frail or institutionalized elderly the increase was 2.5-9%. Several systematic reviews found similar results concerning the growth of muscle tissue. Moreover, patients diagnosed with frailty syndrome, performing endurance training can improve maximal oxygen intake and increase the quadriceps mass through resistance training, which improves the walk speed and enhances mobility [18]. In terms of

resistance and endurance training, the best results are obtained by combining these two exercises. Through regular performing of these exercises, patients were recorded to achieve walk speed of 19 meters per minute. Similar results were obtained in a study lasting for 12 months, where 64 participants (mean age 65 years old) were involved in walks, resistance training, and flexibility exercises. Also, participants had measured the average time of 400m fast walks. At the end of the training cycle, patients had a lower risk of developing disabilities [19]. Another study showed the differences in the development and progression of frailty, between elderly regularly engaged in physical activities and elderly having a sedentary lifestyle. Moreover, the connection of frailty with gender, education and age were also assessed. 46% of study participants (n= 2,964, mean age 73.6) declared performing regular activities of light intensity in their daily life, such as shopping, caregiving, volunteering, light housework, 37% taking at least 150 min of walk per week and almost 19% participating in brisk activities, such as strength training, heavy yard work or dancing. The sedentary group had a significantly higher probability of developing the frailty syndrome in comparison with regularly exercising patients. Researchers also demonstrated a difference between activity type and severity of frailty progression and also a relationship between multiple health conditions (cerebrovascular disease, heart disease, hypertension, lower limb osteoarthritis, pulmonary disease, diabetes, circulation problems in extremities, depression) and a higher risk of developing frailty. Besides the aforementioned health conditions, men, low education level and older age are also connected with the higher risk of developing frailty [20]. A group of 210 elderly was enrolled in a cross-sectional study to assess the impact of physical activity on muscle mass. Participants were assigned to one of two groups: recreational and physical activity, using various physical parameters, such as: nutritional status, calf circumference, and muscle strength. Five individuals from the recreational group (RG) were noticed to have a decrease in muscle mass while in physical activity group (PAG) the same observation was noted in only one participant. Calf circumference (CC) is suggested to be a significant anthropometric tool for evaluating the loss of muscle mass. Therefore, in this study, elderly from the PAG group had higher CC than their peers from the RG group. Muscle strength was also measured using the grip strength of the opposable thumb (GSOT). Higher results achieved elderly from the PAG group (especially men) [21]. In a systematic review of 9 studies, 1,067 community-dwelling frail elders (mean age 82.5 ± 4.3) were included. The main focus was put on different types of physical intervention designated for frail patients that involved progressive exercise training, Weight-bearing for better balance program, Functional-based circuit training program, and balance exercises. Measurements of the frequency of falls, general mobility, balance, functional ability, muscle strength, body composition and frailty status were made. The study established that 3 months of general exercises reversed the occurrence of frailty and when combined with nutrition supplementation gave maximized effect [22].

Association between depression and frailty syndrome

Besides physical activity, another important factor affecting frailty is depression. In a study, which involved patients over 55 years old the correlation between frailty and symptoms of depression was examined. According to Geriatric Depression Scale (GDS), patients were diagnosed as potentially threatened with depression or its symptoms. The first criterion was examining depression and frailty as correlating subjects or as a cause and effect relationship. The study results demonstrated that the correlation between frailty and symptoms of depression varies in a range of 9.3% to 21% for frailty syndrome and 11% to 25.3% for depression, whereas the frequency of occurrence of both of these syndromes simultaneously ranges between 20.7% and 53.8%. Another criterion concerned the influence of both gender and antidepressant medication on depression and frailty syndrome. Women with depression symptoms had a greater risk of developing frailty. Moreover, people taking antidepressants and psychotropic drugs are more prone to develop frailty syndrome [23]. Another study included 542 patients (mean age 55 years old) with frailty syndrome, depression and also liver diseases occurring together. Frail patients had 3.6 times higher prevalence of depression than robust participants. Researchers determined that depression is strongly related to the occurrence of frailty. It was concluded that frailty in combination with depression contributes to higher mortality and deterioration in the quality of life of patients waiting for liver transplantation [24].

Discussion

Physical tests are one of the best methods to detect frailty. They assist in the evaluation of the physical activity level and for this purpose tests such as 6 min walk, 30 sec curl, 30 sec chair stand, grip strength, back strength, chair, sit and reach test can be used. With each of these tests, it is possible to assess the way of working for particular muscles, muscle groups or parts of the

body and also verify patients' velocity, flexibility, grip, and leg strength. Moreover, results of these tests indicate whether frailty occurs or not, and also determine its stage [16]. After the age of 50, the muscle mass decreases by 12-15%, both in men and women. In the second decade of life muscle mass represents 24% of total body mass, while after the age of 70 decreases to only 13% [18,19]. A review of 28 randomized controlled trials conducted among vulnerable older people, evaluated the impact of physical exercises on functional fitness, balance, coordination and other physiological factors. All of the aforementioned elements could be modified by physical activity [25].

Resistance training influences the metabolic, neural, muscular, skeletal, respiratory and even endocrine system. It protects against the development of frailty syndrome and has a great effect on decreasing fat mass, enhancing insulin sensitivity, improving glucose tolerance and reducing blood pressure [19]. Aerobic exercise is more accessible for older people, even though resistance training seems to be more effective in reversing frailty. Especially frail patients during the week should perform 2 hours and 30 minutes of aerobic activity, such as walking. Prolonged physical activity will bring more efficient results in preventing or reversing frailty and its adverse outcomes. Considering elders' capabilities all exercises should be performed under control of rehabilitation professional and preferably at home. Also, the movements should be controlled, slow and carefully adapted [18].

The intensity of physical activity has no effect on frailty prevention. Performing any kind of regular physical activity may reduce the risk of developing the disease. When a patient is already frail lifestyle activities do not affect the progression and treatment of frailty. Therefore, activities such as gardening, housework, and leisure walking are not sufficient to stop frailty. Patients who are regularly physically active, have better functional performance during physical tests, for example, chair rises, gait speed, long distance walk time, compared with people conducting a sedentary lifestyle [20]. Additionally, during resistance training, the recommendation is to supplement a patient with protein, thus ensuring an increase in skeletal muscle mass [26]. In order to boost the protein anabolic effect, four to six protein-rich meals should be provided at regular intervals [19]. The researchers appeal that physical training, both aerobic and anaerobic, nutrition counseling, smoking cessation and mental support can cease or even reverse the negative outcomes of frailty syndrome [24].

The connection between depression and frailty syndrome has a serious impact on health. Depression and frailty occur simultaneously twice more often than as separate diseases. Helping patients affected by these two diseases is essential due to frequently coexisting with depressive disorders reduction of psychomotor propulsion, resulting in physical slowness, apathy, reluctance to cooperate with conservative treatment. Other studies indicate that women coming into contact with depression syndromes are more exposed to frailty as well as people taking antidepressants or psychotropic drugs [23]. Mobilization of patients with frailty syndrome is conducted through physical exercises, which enhances coordination and balance. This approach should result in obtaining greater independence, and also reducing the incidence of falls, fractures, and injuries. However, to initiate such a procedure patient needs to be willing to cooperate, because the quality of life improvement largely depends on the patient commitment and approach to accomplish desirable goal [23,27].

Conclusions

Resistance training is more effective in restoring muscle mass than endurance training. However, aerobic exercise also favors the rebuild of muscle tissue, but to a lesser extent. A combination of these two types of exercises seems to be the most advantageous. Still, due to the limited physical capacity of frail elderly, their ability to perform resistance training may be reduced and thus, aerobic exercises are even more advisable. It is crucial to exercise on at least weekly basis since consistency is the key to completely stop the decline and restore muscle mass.

Conflict of interest
None

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