

Physical activity in the elderly who underwent joint replacement surgery in the course of rheumatic diseases

Agnieszka Prusinowska, Arkadiusz Komorowski, Wiktor Przepióra,
Krystyna Książopolska-Orłowska

Department of Rehabilitation, National Institute of Geriatrics, Rheumatology and Rehabilitation, Warsaw, Poland

Abstract

According to the forecasts of the Central Statistical Office of Poland, in 2030 people at the age of 65 and older will account for 23.8%, i.e. their number will amount to approx. 8.5 m people. Geriatric rheumatic patients more often decide to undergo surgical joint replacement. According to the National Health Fund, the number of joint replacement services provided in 2014 increased by 93%, as compared to 2005. Improving the physical performance of this constantly expanding group of patients requires taking into account many factors to raise their functional status, reduce the risk of falling, teach rules of proper functioning with an artificial joint and encourage unassisted physical activity. Restoring fitness and independence is a difficult but necessary task due to an increasing number of seniors with replaced joint.

Key words: geriatrics, joint replacement, physiotherapy, activity.

Polish society is one of the populations in the European Union which age in the fastest pace. According to the Central Statistical Office of Poland (GUS), in 2006 the rate of people over the age of 60 accounted for 17.5% (6.7 m people) and of 65 ±13.3% (5.1 m people). According to the GUS forecasts, in 2030 people at the age of 65 and older will amount to 23.8% (8.5 m people). It is estimated that in 2050 life expectancy of women will exceed 86 years and in the case of men it will amount to 82 years [1]. There is a growing demand for treatment and rehabilitation for seniors due to their dynamically increasing numbers. According to the National Health Fund (NHF), we have been observing a permanent increase in joint replacement surgeries performed since 2005. In 2014, the number of joint replacement services provided increased by 93% when compared to 2005. Over the period of 2005–2014, the greatest growth dynamics was observed in case of shoulder and knee replacement surgeries. As far as absolute values are concerned, the highest increase was recorded in case of hip replacement (Table I). Over the last 10 years, the number of knee replacements increased from 4072 to

15 814, and in case of artificial hip joints from 26 091 to 41 986 [2].

Regardless of its aetiology, disability caused by rheumatic diseases is usually related to reduction of physical activity. It leads to malfunction of different organs. Immobility promotes the occurrence of local and general complications. The challenge of modern medicine is to reduce disabilities caused by the ageing process. Based on the data from GUS for 2010, the most common diseases that lead to disability among people over 60 include chronic diseases (85%), such as: cardiovascular diseases (59.7%), injuries and diseases of locomotor system (50.2%), injuries and diseases of sight (36.5%), neurological disorders (27.2%). However, low physical activity and high body mass index (BMI) are among the main factors leading to disability unrelated to disease process [3]. According to National Heart, Lung and Blood Institute, overweight or obesity occur in about 66% of adult population and they are connected with chronic health conditions and metabolic syndrome [4, 5].

Specialist literature describes ageing as a process dynamic in nature, whereas old age is described as stat-

Address for correspondence:

Agnieszka Prusinowska, Department of Rehabilitation, National Institute of Geriatrics, Rheumatology and Rehabilitation, Spartańska 1, 02-637 Warsaw, Poland, e-mail: pakiet.naukowy@gmail.com

Submitted: 23.05.2016, Accepted: 30.06.2016

Table I. The number of joint replacement surgeries conducted in Poland over the period of 2005–2014

Joint	Year										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	In total
Hip	26 091	28 626	30 537	34 925	36 896	37 174	38 690	39 923	39 742	41 984	354 588
Knee	4072	5221	6587	8868	10 817	11 839	13 298	14 249	14 403	15 814	105 168
Elbow	21	47	42	70	84	74	94	92	96	108	728
Shoulder	101	116	129	181	200	279	332	392	412	451	2593
Other	95	106	99	93	64	74	99	124	144	222	1120
In total	30 380	34 116	37 394	44 137	48 061	49 440	52 513	54 780	54 797	58 579	464 197

ic [1]. According to WHO reports, there are 3 stages of ageing: old 60–75, senile 75–90, aged 90+ [6].

Over the years, the phenomenon of hypokineses escalates, but it is condemned as a fake model of the happy old age. Seniors believe that this model is based on replacing an active lifestyle with rest and avoidance of physical activity. Exclusion of systematic physical activity leads to a range of limitations related to physical performance and dexterity [7, 8]. According to the GUS data from 2005, only 3% of Poles older than 65 indicated physical exercise as a preferable way of spending leisure time [9]. Development of new habits at an early age, such as participating in different forms of physical, recreational or sports activity, helps to transfer them to adult life. Due to an active lifestyle, BMI may remain within normal [10].

Many adverse effects take place in the human body along with age and limiting or even complete abandonment of physical activity. The most important ones include: decrease in cardiac output and stroke volume, thromboembolic complications, sarcopenia which affects about 40% of patients in the older age, degenerative changes of peripheral nerves, decrease in maximum oxygen uptake of 20–40%, lower number of erythrocytes, bone mechanical resistance, disturbance in thermoregulation, mental disorders and orthostatic hypotension [9, 11]. All the elements must be taken into consideration by a physiotherapist conducting therapy with a geriatric patient.

Physical exercises lasting about 30 minutes or 20 minutes at least 3 times a week are the best form of therapy [10]. Heart rate should be monitored because it cannot be higher than 60–70% of the maximum rate (patient's age should be subtracted from 220) [12]. These exercises should involve aerobic ones (utilising oxygen) and patients should not exercise on apnoea. Breathing exercises should constitute an important part of physical activity. All the exercises from high impact group should be avoided, i.e. jumping, sudden switch from static to dynamic exercises and vice versa. Fast switch

from twisting or bending positions should be avoided, as well. Equipment used should make exercises more appealing and should not be too heavy [9]. Exercises for such group of patients are usually conducted in close cooperation and they should not involve elements of rivalry. Their pace should be adjusted to psychomotor skills of participants.

People that have undergone joint replacement surgery constitute an expanding group of geriatric patients. Fitness-improving programme should include not only factors mentioned previously but also the nature of the artificial joint and more often 2 or 3 joints of both lower and upper limbs. In case of patients with rheumatic diseases, changes in a motor organ, typical for the condition, pose an additional difficulty. The following elements should be taken into account while planning the exercises:

1. Patients who underwent knee replacement surgery can safely bend their operated knee at the angle of 90°, exercises from a kneeling position are not indicated and patients with diagnosed rheumatoid arthritis (RA) should not perform exercises on hands and knees due to specific deformations and pain in the arms.
2. Patients that have undergone hip replacement surgery should have their exercises adjusted in such a way that the bending angle of the hip joint does not exceed 90°, and adduction is not greater than the middle of body axis. Lying on the abdomen is not a proper position for geriatric patients. Replaced joints are not a contraindication, contrary to impaired breathing due to chest compression.
3. Patients with RA suffer from typical hand deformations and surgical treatment more often means replacing metacarpophalangeal and interphalangeal joints with implants. Such hands are more sensitive to weight and support during exercises. Therefore, elastic tapes are a good solution as they may be wrapped around the wrists and they do not have to be held in hands (like e.g. weights).
4. Patients who have undergone shoulder joint replacement have often got a bad motor habit, namely while

- abducting the upper limb, they raise the shoulder engaging mainly the scapula, i.e. the shoulder girdle. Attention should be given to correct posture and performance of the movement within the operated shoulder joint without incorrect compensation.
5. While conducting group exercises, position should not be changed too often due to the specificity of elder patients with rheumatic diseases. Lesions in multiple joints, pain and joint implants (often more than one) hinder the fast and easy change of position from e.g. lying on the back to standing.
 6. Recreational mobility is seen as a more pleasant form of physical activity than e.g. regular exercise. Nordic walking is gaining on popularity. It engages upper body parts without putting too much pressure on lower limb joints, knee joints in particular. Cycling may be recommended to patients, as well. Tricycle is a better option for the patient group in question due to a lower risk of falling.
 7. Aquatic exercises are also a recommended form of activity for geriatric patients and elder patients with rheumatic diseases who have undergone joint replacement. Water environment enables training both with resistance and in offload conditions. This form of activity is recommended to patients whose postoperative wound has healed.
 8. Walking is also a form of activity which is highly beneficial to human body. It provides mobility in multiple joints, oxygenates the body which is of particular significance in geriatric patients. While recommending this form of activity, it should be noted that many geriatric patients with rheumatic diseases use a wide range of orthopaedic products (crutches, zimmer frames, orthopaedic wheelchairs, stabilisers, corsets) that raise energy expenditure of the performed activity.

Usually the goal of exercises conducted with geriatric patients with joint implants is to maintain the full range of motion, enhancing muscle strength, avoiding joint and muscle contractions. In addition, correct gait pattern should be developed in order to move safely and with maximum independence. Assessment of the risk of falling is a particularly important element together with taking action that reduce this risk.

It is thought that injuries resulting from falling are the fifth most common cause of death in people over the age of 65 [13–15].

Factors increasing the risk of falling in older patients include:

- weakening of muscle strength in lower limbs in particular (there may be a correlation between e.g. sarcopenia or long-term immobility),
- gait disturbances, often of multiple aetiology,
- falls in the past,

- incorrect use of the gait-supporting gait (crutches, zimmer frame),
- sight problems,
- polytherapy (five or more drugs concurrently),
- using certain drugs (e.g. sedatives, antidepressants, sleeping drugs, antihypertensive drugs – including diuretics) [16, 17].

Action taken in order to reduce the risk of falling should be multidirectional.

These should include:

- exercises strengthening muscles and their interaction along with exercises improving gait stability,
- balance-enhancing exercises,
- proper selection of orthopaedic equipment,
- elimination of architectural barriers and elements that increase the risk of losing balance,
- elimination of sight problems,
- reduction of adverse effects resulting from polytherapy. Geriatric patients with rheumatic diseases often complain about different kinds of pain. Research shows that older people usually take a broad range of painkillers and they avoid physical activity [18]. In order to reduce or eliminate pain, one may apply physiotherapy, massage or physical exercises that relax tissue tension and have an analgesic effect. The use of orthopaedic equipment, such as crutches – relieving the pressure from joints, stabiliser – elimination of pathological movements in the afflicted joint, also reduces pain.

Physiotherapy brings positive results if it meets the following basic conditions:

- the older the patient the lighter the exercise,
- if there is a need to increase the intensity, the exercise should be rather longer,
- there should be a proper amount of rest after and between the treatment,
- each exercise should be adjusted to the patient,
- it should be noted that all types of energy and treatments may be used at any age,
- it should be noted that older people usually have an energy demand with a lowered tolerance to its overload [19].

During physiotherapy, it should be taken into account that the skin of older patients is thin, they suffer from capillary fragility and, in case of rheumatic patients, we deal with the so-called “parchment skin”.

Scientific and technological progress has become visible in the field of rehabilitation. Telerehabilitation (or e-rehabilitation) is such a novelty. Physiotherapist is not staying directly in the patient’s home but supervises the execution of the exercises on the computer screen. This form of exercise is convenient especially for a patient that can exercise at home alone without

direct assistance of the physiotherapist. This method is extremely suitable for patients who can perform active exercises, but it limits the capability of using many therapeutic techniques e.g. mobilising tissues, working on fascia or even exercises with no pressure. Hybrid rehabilitation consisting of two stages is a good solution to this problem. Stage one consists of traditional exercises with physiotherapist based on cooperation and aimed at learning exercises that the patient will do unassisted in the next stage. On-line exercises emerge during stage two.

Another problem that should be considered is the socio-psychological aspect. Getting to the medical facility means additional physical activity and leaving the house that has become a confinement. Although seniors' participation in the population of internet users has risen six-fold since 2003 [13], it is still scarce. Thus, common use of telerehabilitation is still to be expected.

There are more and more institutions that promote a healthy lifestyle and encourage seniors to spend their time actively. Over the past years there has been a significant increase in the number of third age universities and fitness clubs that offer workouts for seniors. It is a perfect form of physical activity due to the fact that older people are given an opportunity to socialise, motivation to practice (classes start according to schedule), and classes are modified for a specific age group and limitations arising from various motor dysfunctions. Classes are conducted by a physiotherapist who can intervene at any time or who can modify the workout so that it is suitable for every participant [14].

Sleep and rest are another crucial elements. Motivating seniors to exercise will produce good results only if a proper regeneration is possible.

Older people very often suffer from sleep disturbances which does not necessarily mean a reduced need for sleep. However, waking up at night is more common and there is greater sleepiness during the day (frequent naps) [20]. The deepest non-REM sleep stages are either reduced or eliminated, whereas REM stage is retained, at least in the part of population with no degenerative changes. Sleep is affected by a number of vital factors, such as an array of diseases including mental illness and polytherapy [21]. Older people should be reminded that crucial elements of sleep hygiene involve regular physical activity, such as walking, gardening, evening gymnastics, and avoiding intensified physical effort a few hours before sleep [22]. Going for a walk maybe a better option than taking a sleeping pill.

Summary

Fitness of geriatric patients should not only be enhanced to improve muscle strength or range of motion,

but above all else to orient them to improve their independence and safety, thereby reducing the risk of falling.

Joint implants do not require patient to perform continued and incessant exercise. Fitness enhancement should be continued until the full range of motion and muscle strength are restored and movement stereotype is improved. After this period, patient should actively use the operated joint. Exercise should take the form of recreation influencing the whole body, which is particularly important in case of rheumatic geriatric patients who suffer from multiple concomitant diseases.

Group classes are usually more energising, therefore, groups assisted by a physiotherapist should be created whenever there is such a possibility.

Telerehabilitation seems to be a good form of fitness enhancement when patients have difficulties in arriving to the centre. Due to a more common computer usage, it will be gaining on popularity. It is obviously not the form of fitness enhancement addressed to everyone.

Physical activity does not only affect muscles or joints but also the function of all internal organs. It may alleviate sleep problems as well.

Physiotherapy and exercise may have an analgesic effect, therefore, they may help to reduce intake of analgesics in geriatric patients.

Additional diseases frequently occurring in the elderly such as e.g. cardiovascular diseases or diabetes should be considered in the planning of rehabilitation. Abiding by the appropriate rules while undertaking daily activities is a basis for a long-lasting and unproblematic use of the replacement joint.

The authors declare no conflict of interest.

References

1. http://www2.mz.gov.pl/wwwfiles/ma_struktura/docs/51_geriatria_13072011.pdf.
2. http://www.nfz.gov.pl/download/gfx/nfz/pl/defaultstronopisowa/349/26/1/realizacja_swiaadczen_endoprotezoplastyki_stawowej_w_2014_r.pdf.
3. Mazurek J, Rymaszewska J, Lurbiński J. Specyfika i czynniki warunkujące skuteczność fizjoterapii osób starszych w świetle najnowszych doniesień. *Now Lek* 2012; 81: 70-74.
4. Manu V, Joyner MJ, Booth FW. An obligation for primary care physicians activity to sedentary patients to reduce the risk of chronic health conditions. *Reh Med* 2002; 6: 45-52.
5. Pasek J, Mucha R, Sieroń A. Występowanie zespołu metabolicznego w rejonie przemysłowym. *Gabinet Prywatny* 2006; 154: 39-44.
6. Mianowany ME, Maniecka-Bryła I, Drygas WK. Starzenie się populacji jako ważny problem zdrowotny i społeczno-ekonomiczny. *Gerontol Pol* 2004; b12: 172-175.

7. Kozak-Szkopek E, Galus K. Wpływ rehabilitacji ruchowej na sprawność psychofizyczną osób w podeszłym wieku. *Gerontol Pol* 2009; 17: 79-84.
8. Główny Urząd Statystyczny. *Mały Rocznik Statystyczny RP*. Warszawa 2006.
9. Wilińska A. Fizjoterapia w geriatrici. *Pielęgniarstwo XXI wieku* 2010; 32-33: 109-113.
10. Pasek T, Pasek J, Witiuk-Misztzalska A, Sieroń A. Leczenie ruchem (kinezyterapia) pacjentów w podeszłym wieku. *Gerontol Pol* 2011; 19: 68-76.
11. Abellan van KG. Epidemiology and consequences of sarcopenia. *J Nutr Health Aging* 2009; 13: 708-712.
12. Zajączkowski S, Zajączkowski M, Kosiński A, et al. Ocena zmienności rytmu serca (HRV) w zaawansowanym wieku. *Geriatrics* 2014; 8: 232-239.
13. Czapiński J, Będowski P. Aktywność społeczna osób starszych w kontekście percepcji Polaków. Warszawa 2014; 57-61.
14. Morgulec-Adamowicz N, Rutkowska I, Rekowski W, et al. Zmiana aktywności fizycznej w Uniwersytetach Trzeciego Wieku w Polsce. *Gerontol Pol* 2011; 19: 190-198.
15. Skalska A, Walczewska J, Ocetkiewicz T. Wiek, płeć i aktywność fizyczna osób zgłaszających upadki oraz okoliczności ich występowania. *Rehab Med* 2003; 7: 49-53.
16. Woolf AD, Akesson K. Preventing fractures in elderly people. *BMJ* 2003; 327: 89-95.
17. Thornby MA. Równowaga i upadki u osłabionej starszej osoby: przegląd literatury. *Rehab Med* 1997; 1: 11-18.
18. Doroszkiewicz H, Bień B. Profil zachowań osób starszych w walce z bólem narządu ruchu. *Problemy pielęgniarstwa* 2010; 18: 260-265.
19. Wilińska A. Fizjoterapia w geriatrici. *Pielęgniarstwo XXI wieku* 2010; 3-3 (32-33): 109-113.
20. Latimer Hill E, Cummings RG, Lewis R, et al. Sleep disturbance and falls in older people. *J Gerontol A Bio Sci Med* 2007; 62: 62-66.
21. Bidzan L. Zaburzenia snu w wieku podeszłym. *Geriatrics* 2010; 5: 34-40.
22. Szechiński M. Zaburzenia snu. In: *Psychiatria*. Kiejna A, Małyszczak K (eds.). Akademia Medyczna, Wrocław 2009; 190-197.