

Posture and physical activity in dialysis patients

Postawa ciała i aktywność fizyczna u pacjentów dializowanych

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ABSTRACT

A review of the literature concerning posture and physical activity among dialysis patients was performed in order to determine strategies for improving physical activity and thus quality of life in this group of patients.

Correct posture ensures harmonious functioning of the body with optimal efficiency. A sedentary lifestyle has a negative effect on posture and reduces a person's physical fitness. Haemodialysis forces patients to sit or lie down for long periods of time, while the consequences of chronic disease additionally predispose

them to a sedentary lifestyle. Patients with chronic kidney disease treated by dialysis are particularly likely to exhibit sedentary behaviour, and thus are less physically active. The physical fitness of dialysis patients deteriorates due to kidney disease, but also because of concomitant diseases. It is very important to educate patients about the positive effects of physical activity, as well as to promote exercise as a necessary element of treatment for improving their quality of life.

Keywords: posture; physical activity; dialysis; kidney diseases.

ABSTRAKT

W celu określenia kierunku działań zmierzających do poprawy aktywności fizycznej, a tym samym jakości życia pacjentów dializowanych, dokonano przeglądu piśmiennictwa dotyczącego postawy ciała i aktywności fizycznej w tej grupie pacjentów. Prawidłowa postawa zapewnia harmonijne funkcjonowanie organizmu i optimum wydolności. Siedzący tryb życia wpływa negatywnie na postawę ciała oraz obniża sprawność fizyczną człowieka. Hemodializa wymusza pozycję siedzącą bądź leżącą, następstwa choroby podstawowej często również predysponują

do prowadzenia siedzącego trybu życia, a tym samym mniejszej aktywności fizycznej pacjentów z przewlekłymi chorobami nerek. Kondycja fizyczna w przypadku pacjentów dializowanych pogarsza się zarówno z powodu samej choroby, jak i pod wpływem chorób towarzyszących. Bardzo ważne jest rozpowszechnienie wśród dializowanych osób informacji na temat pozytywnych skutków ruchu oraz promocja aktywności ruchowej jako niezbędnego elementu leczenia wpływającego na jakość życia.
Słowa kluczowe: postawa ciała; aktywność fizyczna; dializa; choroby nerek.

INTRODUCTION

The number of patients on dialysis is dramatically increasing worldwide [1], while the average age of dialysed individuals is decreasing. Therefore, it is extremely important and urgent to modify the lifestyle of these patients so they can enjoy a good quality of life for as long as possible. In Poland, about 20,000 patients were on dialysis in 2010. Each year, this number grows by a few percent [2, 3]. Every second death of a dialysis patient results from cardiovascular complications [2].

A review of the literature concerning posture and physical activity in patients on haemodialysis was performed in order to identify strategies for increasing physical activity and thus improving quality of life in this group of patients.

POSTURE

Wolański defined posture as the accustomed body position that a person takes when standing [4]. Correct posture determines

the proper functioning of the human body [5]. The type of posture depends on the phase of ontogenetic development, sex, and environmental conditions [6]. Kasperczyk defines correct posture as a harmonious arrangement of the individual parts of the body in relation to each other and in relation to the mechanical axis of the body, maintained at the minimum tone of the muscular and nervous systems [5].

A correct posture is one that ensures a harmonious and effortless arrangement of the individual body parts in relation to the long axis of the body. It is a system of body segments not affected by pathological changes, which:

- ensures optimal stability of the body,
- requires minimal muscular effort for its maintenance,
- creates conditions for optimal positioning of internal organs.

Correct posture ensures harmonious functioning of the body at an optimal performance level. When correct posture is held, individual sections of the body ensure smooth movement and stable support with a minimum of energy required.

Stable posture and freedom of movement are facilitated by the spine [4]. The spine is the axis of the human skeleton. It stabilizes the human body in a standing position, but also allows for mobility and movement. The health and function of the spine depends on the balance between its natural curvatures (which should be of appropriate length and depth) and the strength of postural muscles that stabilize it [7, 8, 9, 10].

Any change in the position of one spinal section in relation to another influences multiple different parts of the body – both close to and more distant from the site of pathology. An increase in cervical lordosis leads to a compensatory increase in thoracic kyphosis and lumbar lordosis [6, 11]. As a result of the increased thoracic kyphosis, the ribs become more oblique, the chest is flattened, the abdominal muscles become relaxed, and pelvic anteversion increases. Incorrect posture affects not only the skeletal system, but also the function of other anatomical systems of the human body. Abnormal shaping of the chest causes changes in its mobility, which disturbs the respiratory mechanism and deteriorates conditions for the functioning of the lungs. This has a significant effect on the respiratory system. Incorrect posture also affects the function of the nervous system by disturbing coordination static and dynamic balance of the body. Scoliosis can also lead to the dislocation of organs of the digestive and respiratory systems [6, 12, 13].

Postural disorders are associated with natural aging processes, which lead to damaging of skeletal structures, and overload resulting from unhealthy behaviours: unilateral loads on the spine, forced unilateral positions, prolonged sitting, prolonged standing in a leaning position, incorrect lifting and carrying weights, and changes of unknown aetiology. Overloads cause faster wear, degeneration, and malformation of skeletal and articular structures, create more difficult conditions for spinal work, and increase the susceptibility of the spine to further overloading [6, 8, 9, 14]. The causes of postural disorders and their consequences in the skeletomuscular system trigger a chain reaction and accumulate [7, 8, 9, 10].

Correct posture is maintained by the deep abdominal muscles. The muscles of the back, abdomen, and pelvic girdle support the spine.

Strong and flexible muscles maintain natural, physiological curvatures and help the spine to fulfil its function, i.e. stability and mobility of the body. Well-developed, properly working postural muscles and proper behaviour (during rest, position changes, lifting weights) in the activities of daily life save the spine and serve a protective function, reducing the load on joints and periarticular structures, thereby preventing pain in various parts of the body, especially the spine (cervical section, lumbar section) [15].

Therefore, it is important to maintain correct posture by strengthening the muscles of the back, abdomen, shoulder girdle, and pelvic girdle [12].

In patients on dialysis, posture is affected by factors related to age, primary disease, and comorbidities, but is also strongly influenced by sedentary lifestyle. This results from the fact that the patient is forced to sit or recline during dialysis and transport to the dialysis centre, but also from associated lifestyle

changes. For example, about 40% of dialysis patients give up work, 28% reduce the number of social contacts, and the majority of patients significantly reduce their physical activity [3].

PHYSICAL ACTIVITY

A sedentary lifestyle not only has a negative effect on posture, but also reduces physical fitness. It has a negative effect on the whole skeletomuscular system: it weakens muscles, reduces the flexibility and mechanical strength of tendons and ligaments, limits range of motion in the joints, and impairs coordination and sensorimotor control [16]. It reduces the ability to perform more physically demanding activities (requiring more effort, strength, commitment, and energy) such as sport, but also makes basic activities of daily life (related to personal care and hygiene, cooking and eating meals) difficult or even impossible [1].

It is widely known that sedentary behaviour is a significant risk factor for premature death in the general population, mainly due to cardiovascular diseases [17, 18]. This risk is 67% higher in patients on dialysis who are physically inactive [19]. To reduce the risk of cardiovascular death, adults need moderate-intensity aerobic physical activity for at least 30 min, maintaining the heart rate (HR) at a level of about 60% of the maximum HR, 5 days per week (e.g. walking briskly for 30 min) [17]. Despite the well-known benefits of physical activity, only a negligible proportion of surveyed populations achieve this minimum target [18].

Patients on dialysis are particularly predisposed to sedentary behaviour. They spend about 12 h each week in a supine or semi-supine position during haemodialysis. Most patients are transported to a dialysis centre and only a small percentage of patients are professionally active [1, 19, 20, 21].

Such a lifestyle predisposes patients to reduced physical activity and prolonged stay in positions which have a negative effect on the skeleton. Studies by Gomes et al. revealed, for example, that the majority of dialysis patients, compared to the control group, followed a sedentary lifestyle not only on days of dialysis, but also on days between dialysis sessions [21]. Patients on dialysis spend about 70% of their time in a supine position [22], and their physical activity, such as walking or standing, is about 30% lower than in control subjects [21]. Heleniak et al. reported that only 34.5% of dialysis patients declared regular physical activity, and 35.4% attended to their normal body weight [23].

Idle time spent on dialysis contributes to the reduction of physical activity. Muscle strength decreases, the performance of the cardiovascular and respiratory systems decreases, fatigue during movements occurs faster, and joint mobility decreases [21, 24, 25]. This has a detrimental effect on posture, physical and mental health, general performance, and quality of life [26, 27, 28, 29].

Exercise and regular physical activity are the best and most effective ways to maintain correct posture, ensuring physical fitness, wellness, independence, self-reliance, and better functioning in everyday life.

Dialysis patients, however, are reluctant and anxious about taking up physical activity, prefer a sedentary lifestyle, and lack the motivation to make changes in daily life. They avoid regular exercise, but are also reluctant to undertake daily tasks. A low level of professional activity and significantly reduced quality of life cause a lack of motivation to engage in everyday life activities, and this discourages patients from taking up physical activity [2, 30, 31].

Reduced physical fitness is mainly caused by dysfunction of skeletal muscles. Skeletal muscle dysfunction is caused by the loss of active muscle mass (atrophy) and loss of muscle strength (sarcopenia, i.e. significantly reduced muscle strength), especially in legs. This can lead to difficulties in doing daily routines and loss of self-reliance, as well as increased deposition of fatty tissue [19, 24, 31, 32, 33, 34].

The physical fitness of dialysis patients deteriorates due to kidney disease itself, but also because of concomitant diseases (hypertension, obesity, diabetes and related lower limb neuropathy, cardiovascular disease, and others). Despite many reports [1, 16, 20, 21] emphasizing the positive impact of activity and rehabilitation on the health of patients with chronic kidney disease, exercising is not widely introduced into treatment plans. Patients on chronic dialysis are at risk of developing many associated complications. These complications include, primarily, diseases of the cardiovascular and skeletal systems. The risk of cardiovascular diseases in this group of patients is 10–30% higher than in the general population [20].

Many dialysis patients are diagnosed with hypertension, atherosclerosis, hyperlipidaemia, and obesity. Regular physical activity helps reduce the risk of cardiovascular diseases or, if they are already diagnosed, control their consequences [35, 36]. Because dialysis patients require special medical care, attention should be paid to the role of physical activity and its positive impact on reducing the risk of cardiovascular events, normalizing the biochemical blood parameters, and reducing body mass. An appropriately adjusted level of physical activity may indirectly and directly reduce the risk of cardiovascular diseases [37].

For example, studies by Yamamoto et al. demonstrated that the incidence of cardiovascular events was significantly lower in patients who regularly attended physical activity sessions during 3 years of dialysis [38]. Physical activity has a strong impact on mental health and can be used as non-pharmacological treatment, preventing depressive episodes and mood changes, which are significantly more frequent in dialysis patients [1, 2, 19, 24, 39, 40].

It has been proven that physical activity (including physical rehabilitation) improves physical fitness, increases the ability to perform activities of daily life, and improves quality of life scores [2, 19, 40]. Recommendation of moderate-intensity activity (adjusted to the patient's ability) could improve the functioning of patients during dialysis, and could also reduce recovery time after transplantation [2].

Physical activity in haemodialysis patients [26, 27, 28, 29, 31]:

- improves general wellness,
- reduces the incidence of complications associated with concomitant diseases,

- improves quality of life,
- helps to maintain an independent lifestyle (makes everyday activities easier),
- improves physical performance, neuromuscular coordination, and helps maintain the range of movements necessary in everyday life,
- improves neuronal connectivity, coordination, and balance,
- improves muscle strength,
- helps maintain correct posture,
- improves psychosocial functioning,
- when done during dialysis, it makes the procedure less monotonous (dialysis in medical centres is done under constant supervision from medical staff) [41].

It is very important to educate dialysis patients on the positive effects of exercise and rehabilitation, as well as to promote physical activity as a necessary element of treatment improving their quality of life. Ongoing motivation of patients to exercise should be a standard element of the therapeutic process [21, 42, 43]. This is formally recommended by the The National Kidney Foundation Kidney Disease Outcome Quality Initiative (NFK-K/DOQI) [44]. All nephrologists are aware of the benefits of physical activity, but only 30% implement it in practice by offering patients rehabilitation plans [2]. A very good promotional effect was achieved in a Canadian study, in which patients and their relatives viewed an educational research-based film, "Fit for dialysis", presenting the health benefits of physical activity for dialysis patients and demonstrating sets of simple exercises that can be performed during dialysis and while waiting for it. A clear increase in the physical activity of patients was observed in response to this educational project [41].

There are many different rehabilitation plans offering a variety of training modalities, training durations, venues, and durations of activity [19, 30, 45, 46].

Some venue-specific rehabilitation plans include [19]:

- rehabilitation during haemodialysis sessions,
- rehabilitation on non-dialysis days,
- rehabilitation in medical centres,
- rehabilitation in the patient's home.

Rehabilitation while receiving haemodialysis involves mainly the legs, and sometimes the non-catheterised arm. It is recommended to train during the first or second hour of the procedure. A single session should last 20–60 min [47]. A 3–12-month series of rehabilitation sessions increases muscle strength, improves physical fitness and self-esteem, and reduces the incidence of depressive episodes. A very important advantage of this kind of rehabilitation is that only a small percentage of patients abandon this therapy [19].

Rehabilitation on non-dialysis days allows for a greater variety of exercises and activities, both at home and in sports and recreation, as well as rehabilitation centres. Unfortunately, patients more often give up rehabilitation outside of the dialysis centre. Rehabilitation at home includes individual sets of exercises depending on the preferences of the patient: recreational activity, e.g. walking or gardening, targeted physical activity

such as swimming, gymnastics, and yoga, and changes in daily habits, e.g. taking stairs instead of the lift [19].

Patients may be offered different training modalities, categorized as:

- aerobic (endurance),
- resistance,
- combined.

Studies by Scapini et al. revealed that a combined training modality (aerobic and resistance) was the most effective type of physical activity for haemodialysis patients. Training improves aerobic capacity, normalizes blood pressure and lipid profile, and increases tidal volume [45].

The intensity of training should be adjusted to the patient's health and increased gradually. According to Szymańska et al., heart rate should not exceed 85% of the maximum heart rate achieved during endurance testing. Initially, the patient should only exercise for a few minutes. After the patient adapts, exercising can be done for a longer time. Each training session should start with a 5-min warm-up, followed by the actual training, and finally breathing and relaxation exercises [47].

Physical activity appropriately adjusted (with the help of a physiotherapist and physician) to the fitness and interests of the patient, done on a regular basis, can help to improve his or her physical and mental health and social interactions.

CONCLUSIONS

Medical personnel should encourage physical activity in dialysis patients as a standard element of the therapeutic process. Before introducing physical therapy, the physician and physiotherapist should assess the patient's status in terms of the indications and contraindications for exercise. The exercise plan should be tailored to the patient's health and abilities [46].

There are many simple and accessible forms of activity that can be done with little effort and at a low cost. These include walking, Nordic walking, cycling, swimming, jogging, tai-chi, and gymnastics at home or outdoors. It is worth encouraging patients to find a type of physical activity suitable for them, and to exercise regularly. This is not easy, because it requires self-discipline and motivation, but increasing active behaviour significantly improves the patient's health and quality of life [41, 48, 49, 50, 51, 52, 53].

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