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## A Functional Investigation of the Movement System in Hemodialysis Patients

### Summary

**Background:** Patients treated with dialysis survive longer nowadays which has led to increasing number of already numerous musculoskeletal complications – Musculoskeletal System Disorders (MSD) in dialyzed population. We hereby submit a survey abstract describing musculoskeletal system disorders of dialysis patients which consists of items from researches carried out and published mainly abroad.

**Objectives:** The purpose of this study was to find out the frequency of MSD in hemodialysis patients.

**Methods:** The ascertained frequency of diagnosed MSD in the tested group (N = 27, 16 men/11 women, age range of 28-86, percent occurrence equals to 81.5 %) was statistically compared with the frequency in the normal population. The functional condition of the locomotor system, detected by means of clinical – mainly physiotherapeutic investigation (kinesiologic analysis etc.), was compared with the results of the foreign studies being discussed.

**Results:** The higher incidence of MSD in the monitored group was proved in comparison with population of the Czech Republic ( $p < 0.05$ ). The most frequent diagnose was arthrosis and the back pain was revealed as the most common symptom.

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Conclusion: Dialysis patients can be labeled as a special group of patients with an evident high frequency of certain MSD that requires an appropriate approach considering the physiotherapeutic intervention to standard renal medical care.

## 1. Intrudaction

The problems of the human muskuloskeletal system are indisputably reflected in motion – one of the inseparable part of active life style. This apply for Either healthy or diseased man. People treated with dialysis survive longer nowadays which has led to increasing number of already numerous musculoskeletal complications – Movement System Disorders (MSD) in dialyzed population (Ramaswamy et al., 2006). We asked a question: “Is it possible to designate dialysis patients as a special group of patients with an evident high frequency of certain muskuloskeletal system disorders (MSD)?“

First we submit a survey chart describing movement system disorders of dialysis patients which are items from research projects realized and published abroad. We have divided them into six groups according to a point of affliction (Table 1).

Table1. *The Movement System Disorders (MSD) in Dialysis Patiens (Jurová et al., 2009)*

Group of disorders upon impacted tissue	Name of disorder	Subgroups
Whole movement system	Low exercise capacity	
	Fatigue	Muscle fatigue Postdialysis fatigue
	Reflex visceral pattern	Pain - most common is Low Back pain Muscle spasms, trigger points Decreased Joint Flexibility Joint blocks Disorders of Stability Defected Movement Stereotypes
	Dialysis-related Amyloidosis	Bone tissue Synovial tissue Ligament tissue Periferal nerve tissue

Joint tissue	Dialysis-related Arthropaty	Shoulders, knees, etc.
	Infectious Discitis	
	Crystal-induced Arthropathy	
Bone tissue	Renal osteodystrophy	Spontaneous bone fractures Spontaneous ligament ruptures
	Osteoporosis	
Peripheral nerve tissue	Uremic Peripheral Polyneuropathy	
	Diabetic Peripheral Polyneuropathy	
	Mononeuropathies	n. ulnaris, n. medianus
Skeletal muscle tissue	Uremic myopathy	
	Disturbanced mineral metabolism	
	Progressive Parathyreoid Myopathy	
	Focal myositis	
Others (non-classifiable into surveyed groups)	Uremic restless legs syndrom	
	Uremic Involuntary Movements	Asterixis (flapping tremor)
		Action myoclonus-renal failure syndrome
Uremic twitch-convulsive		
		Chorea

End-stage renal disease (ESRD) treated with dialysis is evidently linked with certain locomotor system disorders. On the basis of these facts we decided to conduct this study.

The above mentioned studies describing common MSD of the dialysed population made use of certain laboratory equipment (such as magnetic resonance, sonography, x-ray, biochemical analysis and others). Compared to that, the purpose of this study was to find out the frequency of MSD in hemodialysis patients by commonly use clinical physiotherapeutic investigation (not strenuous for patients, relatively inexpensive for researchers).

## 2. Material and Methods

The study was realized at the privat dialysis centre Dialcorp in Prague, Czech Republic (2007-2008). The monitored group contained male and female patients with ESRD who were in a suitable state of health. The group had no age limitation (28-86 years). The total number of patients studied was 27 (16 men/

11 women), called group A. Group A underwent the 1<sup>st</sup> part of the study – the collection of anamnestic information (internal records of dialysis centre, anamnestic inquiry and supplementary dialogue). Only 16 patients (10 men/6 women) from group A participated in the 2<sup>nd</sup> part of study – investigation of the locomotor system's condition, called group B. 2<sup>nd</sup> methodical part contained: kinesiologic analysis of posture shown at Fig. 1, functional investigation of spine, estimative investigation of the deep stabilisation system activation, distribution of weight while standing, neurologic investigation of tactile sensation in lower limbs, visual investigation of breathing locomotive stereotype, chair-stand test selected from the Senior Fitness Test battery.

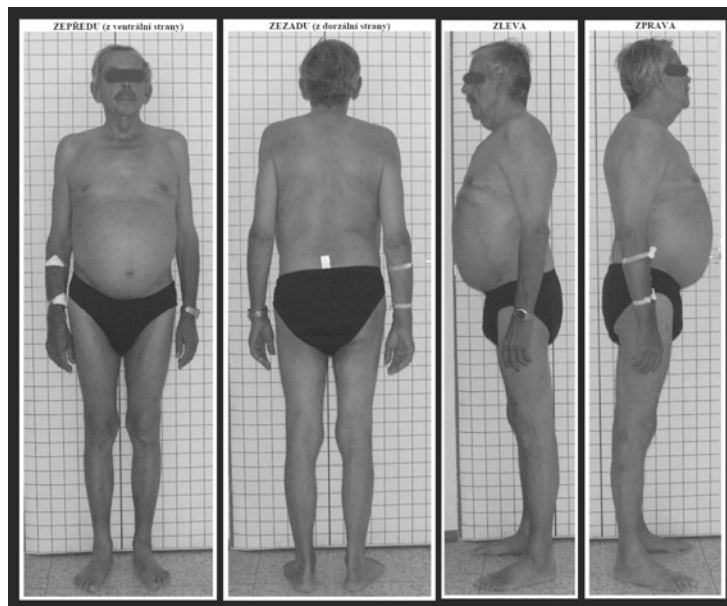


Fig. 1. Kinesiologic analysis of posture from frontside, backside and sideways.

The ascertained frequency of diagnosed MSD in tested group A ( $n = 27$ ) was statistically compared with the frequency in the normal population of the Czech Republic (Skála, 2007). Then, because of the advanced average age of the group, it was also compared with the frequency in an older population of the Czech Republic (Zavázalová, 2004). The results of the clinical investigations conducted with group B were ordered by descriptive statistics.

### 3. Results

The ascertained frequency of diagnosed MSD in the tested group ( $N = 27$ ) equals to 81.5 %. In comparison with normal population of the Czech Republic,

the investigated group A (n = 27) proved to have a higher incidence of locomotor system disorders, likewise in comparison with the older population of the Czech Republic ( $p < 0.05$ ).

The most frequent MSD included arthrosis, diabetic polyneuropathy, fractures and malfunctions of the spinal area (Fig. 2).

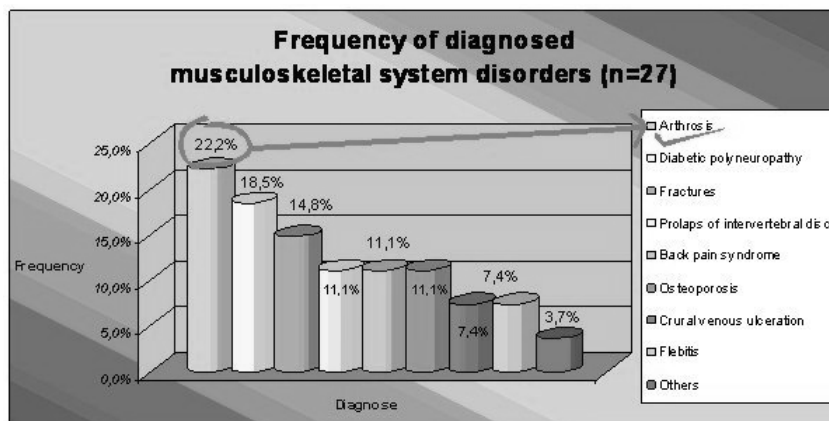


Fig. 2. Frequency of diagnosed musculoskeletal system disorders (the disorders are listed in descending order in the legend as they are presented in the graph).

The most common symptom was pain (Fig. 3) and the most frequently affected part of the body was the spine.

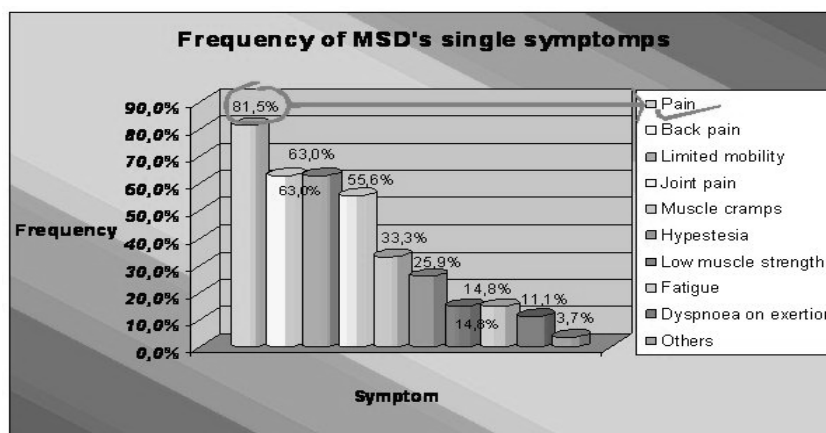


Fig. 3. Frequency of MSD's single symptoms (the symptoms are listed in descending order in the legend as they are presented in the graph).

The most important locomotor system dysfunctions found in the clinical investigation of group B (n = 16) were alteration in posture (50-87 %), limited range of spinal motion (80-93 %), hypertonus and hypertrophy of paravertebral muscles in Th-L part of spine (73-100 %), insufficiency of the deep stabilization system of the spine (69 %), disrupted pattern of breathing (60 %), acral sensation deficit (79 %, 71 % bilateral limitation) and muscular strength insufficiency of lower limbs (60 %).

#### **4. Discussion**

We have submitted different groups of certain movement system disorders. The first (compilation) part is based on laboratory equipment which mainly detects structural lesion. Conversely, the second part is based on a clinical investigation (largely flawed by subjectivity) which is focused on the faulty function of the locomotor system. The causes of both, structural and functional disorders are intertwined. The results of both parts are not identical in the final output, however, their differences are not too big. There is no direct interdependence between the theoretic research and results of the study in the diagnosis. The main reasons for this could be a deficient number of tested individuals and the use of different methods of investigation.

Nevertheless, the end-stage renal disease treated with dialysis is evidently linked to certain locomotor system disorders, those with a structural cause or those with functional cause. MSD significantly affects a functional ability (Perryman and Harwood, 2004) contributing to a reduced health-related quality of life, especially in the sphere of autarchy. Therefore, we consider the functional investigation focused on functional deficit of musculoskeletal system to be very important.

Physical exercise through physiotherapeutic intervention optimises a functional ability, positively impacting autarchy which is an important part of health related quality of life. By means of physical therapy, it is possible to postpone dependence on the second person care and to save costs associated with nursing care in the socio-economic area.

#### **5. Conclusion**

Dialysis patients can be marked as a special group of patients with an evident high frequency of certain MSD that requires appropriate approach regarding targeted physiotherapeutic intervention.

#### **6. Acknowledgement**

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