Abstract
Assessment of physical capacity is of much interest in people with diabetes mellitus in order to correctly prescribe an exercise program for these patients. Therefore, the aim of this study was to assess the functional exercise capacity and the quality of life in a sample of patients with type II diabetes mellitus.

For this cross-sectional study, 20 consecutive type II diabetic women and 20 age and sex matched healthy controls were recruited. The physical capacity was assessed using the 6-minute walk test (6MWT). There were no significant differences between groups in terms of anthropometric characteristics. Mean age in patients’ group was 62.35±5.21 years and in control group 61.82±4.89 years. In the 6MWT, the distance covered by the diabetic patients was 498.56±58.3 meters, significantly shorter than that covered by the control group (601.34±42.5 meters) (p<0.05). The A QoL-4D scores were significantly lower in patients’ group compared to controls (0.297±0.089 vs 0.778±0.091). The functional exercise capacity and the quality of life are reduced in patients with type II diabetes mellitus compared to healthy controls.

Key words: functional exercise capacity, type II diabetes, 6MWT.

Introduction
The prevalence of diabetes mellitus is relatively high in the adult population, being an important cause of death in developed countries (1,2). The diabetes symptoms and complications negatively affect the patients quality of life, the physical function, leading to deconditioning and deterioration of overall health status (physical and emotional) (2,3). The exact causes of reduced physical fitness and exercise capacity are unknown. The associated cardiovascular diseases and dysfunctions, accentuated by the chronic low-level inflammation (with increased inflammatory markers such as interleukin-10, 18, tumor-necrosis factor-alpha, adiponectin), overweight and obesity, poor glycemic control, associated with high levels of physical inactivity are some of the factors responsible for the low exercise tolerance and capacity in patients with diabetes mellitus (1,4–9). The decreased lower limb muscular strength and impaired mobility also play an important role in the lower functional capacity, which influences the health-related quality of life in diabetes mellitus patients (10).

The impact of diabetes on the health-related quality of life has been studied and patients with type 2 diabetes mellitus has been shown to have a lower quality of life (11,12). Assessment of physical capacity is of much interest in people with diabetes mellitus in order to correctly prescribe an exercise program for these patients and to improve the quality of life. Therefore, the aim of this study was to assess the functional exercise capacity and the quality of life in a sample of patients with type 2 diabetes mellitus.

Material and method
For this cross-sectional study, 20 consecutive type II diabetic women and 20 age and sex matched healthy controls were recruited. The inclusion criteria were aged 50 to 70 years, diagnosis of type II diabetes for at least two years, under a pharmacological regimen stabilized for at least five months, living independently. Patients presenting diabetes peripheral neuropathy or severe musculoskeletal disorders were not included.

The physical capacity was assessed using the 6-minute walk test (6MWT). The test was performed on a 30-meter straight corridor with no obstacle, according to the American Thoracic Society protocol (13). The patients walked on a self-selected speed. The distance walked in 6 minutes was recorded. The oxygen saturation was also recorded. The quality of life was assessed with the Assessment of quality of Life (AQoL)-4D questionnaire. This questionnaire evaluates four dimensions of the health-related quality of life – independent living,
social relationship, physical senses and psychological well-being. The score is ranging from -0.04 (worst possible quality of life) to 1 (full quality of life) (14,15).

The statistical analysis was performed with the MedCalc software. Data were compared between groups, using the Student t-test. The statistical significance was set at p<0.05.

Results
There were no significant differences between groups in terms of anthropometric characteristics. Mean age in patients’ group was 62.35±5.21 years and in control group 61.82±4.89 years. All participants were overweight with a mean BMI of 28.87±3.1 kg/m² in patients’ group and 27.23±4.2 kg/m² in control group.

All participants performed the 6MWT. None of the women evaluated in this study accused any symptoms that could interfere with the test’s results (chest pain, dyspnoea, leg pain or cramps). The distance covered by the diabetic patients was 498.56±58.3 meters, significantly shorter than that covered by the control group - 651.34±42.5 meters (p<0.05) (Figure 1). No significant reduction in oxygen saturation was recorded during and after the test.

Discussion
The aim of the present study was to assess descriptive functional exercise capacity in a sample of patients with type II diabetes mellitus. The results demonstrated a significantly lower functional exercise capacity in diabetic patients compared to healthy age matched controls.

The six-minute walk test is reliable easy-to-use test recommended to evaluate the physical function and walking endurance in different adult population with a wide variety of cardio-pulmonary diseases (16–18). The previous studies that used the 6MWT to assess the physical capacity found significant lower distances covered by the patients with diabetes mellitus compared to controls. Kuziemski et al showed that diabetes patients had a 109 m shorter distance covered during the 6MWT than the healthy controls, as well as a pulmonary function (19). Awotidebe et al also found that patients with type II diabetes demonstrated lower functional exercise capacity than healthy controls (20). Similar results were also found by other authors (21–23).

Our results showed a lower quality of life in patients with diabetes mellitus compared to controls, as assessed by the AQoL-4D questionnaire. Similar results were reported in previous studies, a poorer quality of life being associated with adverse outcomes, like disease progression, low response to therapy, mortality (24–26). Health-related quality of life is an important outcome in patients with chronic diseases, assessing multiple domains like physical and mental health, social functioning (27–29). The functional exercise capacity should be tested in all diabetes patients, with or without cardiovascular associated diseases or complications. Along with the tests used for the exercise capacity testing, balance and muscular strength assessments should also be performed in people with diabetes mellitus (20,30–32). All these will allow a better, individualised exercise programme prescription. Participating in regularly exercise programmes has been proved to have beneficial health effects in all categories of population, younger and older, with metabolic, cardiovascular or musculoskeletal disorders, improving the quality of life and decreasing the mortality (1,33–36).

The limitations of the present study should be noted. The study sample comprised a relatively small number of female patients and this aspect could limit the generalizability of our findings to male diabetes mellitus patients, or to other age groups.
Conclusion
The functional exercise capacity and the quality of life are reduced in patients with type II diabetes mellitus compared to healthy controls. Further studies are needed to identify the risk factors for the low functional capacity in order to improve the quality of life in diabetic patients.

REFERENCES


