

# Factors affecting the level of physical activity, anxiety and quality of life in patients with congestive heart failure and implanted automatic cardioverter-defibrillator

## SUMMARY

### Introduction

One of the diseases of the cardiovascular system is heart failure. It is the only cardiovascular condition whose incidence and prevalence rates are constantly increasing, which is a consequence of the ageing of society, as well as the implementation of modern methods of treatment of acute coronary syndromes and arterial hypertension. While the treatment of acute conditions is highly effective, handling late complications is not. In developed countries 1-2% people are diagnosed with heart failure (10% of people over 70 years of age). It is estimated that in Poland approximately 2.4% of the whole population suffer from heart failure. The objectives of the therapy of patients with heart failure involve the improvement in the quality of life, enhancing physical efficiency, improving patient's clinical status, reducing the risk of rehospitalisation, and reduction of the general case-fatality ratio. It should be emphasized that the treatment of this condition is interdisciplinary and involves numerous procedures. Those can be divided into non-invasive (pharmacotherapy, diet, physical activity) and invasive ones (implantable cardioverter defibrillator – ICD, cardiac resynchronisation therapy – CRT, ventricular assist device – VAD, heart transplantation).

### Aim of the study

The objective of this work was to assess how the significant clinical circumstances in the use of an ICD/CRT-D:

- a type of sudden cardiac death (SCD) prevention; primary vs. secondary – as an indication for the ICD/CRT-D implantation in patients with heart failure,
- past ICD/CRT-D interventions (appropriate and/or inappropriate),
- occurrence of incidents of electrical storm (ES) in patients with an ICD/CRT-D

affect the quality of life, the level of anxiety and stress, the occurrence of the symptoms of depression and the level of physical activity.

### Material and methods

The study involved 111 participants (17 women and 94 men), aged 25–91 (age average 56.5), with heart failure with ischaemic or non-ischaemic aetiology, who had undergone an insertion of an

implantable cardioverter defibrillator – ICD, or a cardiac resynchronisation therapy – CRT, staying under care of the Cardinal Stefan Wyszyński Institute of Cardiology in Warsaw.

The participants were divided according to three criteria:

- indication for an implantation (primary and secondary prevention),
- type of electrical shock (appropriate, inappropriate, no shock),
- incidence or non-incidence of electrical storm.

All patients underwent a test measuring psychological variables and the quality of life with the use of the below-mentioned questionnaires, in order to analyse the relationship between their results and the type of prevention as the basis for the implantation, as well as the profile of experienced ICD or CRT-D interventions:

- physical activity – International Physical Activity Questionnaire (IPAQ; short version),
- quality of life – Nottingham Health Profile (NHP) in the Polish language version, adapted by Kazimierz Wrześniewski,
- level of perceived stress – Perceived Stress Scale (PSS-10), adapted by Zygfryd Juczyński,
- incidence of depression and its severity – Beck's Depression Inventory (BDI) in the Polish language version,
- self-administered questionnaire – 61 questions concerning personal data, history of presenting complaint, type of treatment, anxiety scale (0–10 scores), concentration and memory disorders, sleep disorders, physical activity.

## Results

In this work, the obtained scores were analysed with reference to the classification of the indications for an implantation. It was established that the level of physical activity of patients for whom the indication was secondary prophylaxis, significantly decreased after a life-threatening incident and the implantation of a cardioverter-defibrillator.

Study results suggest that the physical activity of the patients from the primary prevention group remained unchanged (79.4%), whereas in the group of patients from the secondary prevention group it significantly declined (47.2%,  $p = 0.0006$ ). Although in both groups the preferred type of activity remained walking and cycling, the percentage of patients that took part in those activities was significantly lower in the secondary prevention group ( $p = 0.016$ ,  $p = 0.010$ , respectively).

The symptoms of depression were not observed in either group, the level of anxiety in both groups was average, and the level of chronic stress was between average and high. There was a tendency to a higher level of anxiety in patients from the secondary prevention group. The scores in the second part of the NHP questionnaire indicate that the patients after the implantation of a device for secondary prevention of a sudden cardiac death pointed to problems connected with housework (64.9% vs 37.8%,  $p = 0.007$ ) and social life (51.3% vs 24.2%,  $p = 0.004$ ) significantly more often than the patients from the primary prevention group. Additionally, problems with family life were

identified in that group twice as often. For that feature of the quality of life, the difference did not reach statistical significance, though (9.5% vs 1.9%).

Another analysis concerned the patients divided into groups with electrical shocks (appropriate vs inappropriate and without shock). No statistically significant differences were identified between the groups in the level of physical activity of patients, assessed before the implantation of a device. As the questionnaire revealed, that level changed to a various degree depending on the incidence and the type of shock. And thus, in 60.4% of patients who had not experienced a shock, the activity remained at the same level or even at a higher level, whereas it declined in the majority of patients with appropriate shocks (65.1%,  $p = 0.013$ ). The reason for this was the limitation of activity for fear of electrical shock observed in as many as 67.5% of the patients who had experienced appropriate incidents, and in only 35.9% of patients who had not experienced electrical shocks ( $p = 0.002$ ).

The IPAQ scores corresponded with the above-mentioned observations, particularly for the moderate-intensity type of activity, for which the median of a whole-week physical activity in the group of patients without interventions (720 MET-minutes/week) and with inappropriate shocks (720 MET-minutes/week) were significantly statistically higher than in the group of patients with appropriate shocks (0 MET-minutes/week,  $p = 0.0002$  and  $p = 0.041$ ).

No statistically significant differences were observed between the analysed groups with reference to the level of depression, measured with the BDI. Despite the fact that its average level in the group of patients with past shocks was approximately 3 scores higher than in the group without shocks, the difference did not reach statistical significance ( $p = 0.08$ ). Significant differences were observed, though, with reference to the fear of shocks, which was identified more often in the group of patients with appropriate shocks (74.4%) and inappropriate shocks (85.7%) in comparison with the patients that had not experienced such incidents (46.3%) ( $p = 0.005$  and  $p = 0.0008$ ). Apart from expressed more frequently fear of electrical shock, which occurred in those groups, the intensity of anxiety measured on the analogue scale reached a high level as well. The median for the patients without electrical shocks equalled 0; for those with shocks 6 and 5.5 ( $p = 0.0007$  and  $p = 0.044$ ). Moreover, the analysed groups did not differ in the level of intensity of chronic stress connected with their life situation, assessed with the PSS-10. The analysis of the second part of the NHP questionnaire revealed a statistically significant difference between a faction of participants (60.5%) who experienced a negative influence of the current health status on housework; in the group of patients with appropriate shock in comparison with a faction of such participants (35.2%) in the group without shock,  $p = 0.01$ .

The third analysis involved the patients divided into two groups: those who had experienced electrical storm and those who had not. There were no statistically significant differences between the groups with reference to the level of physical activity, assessed before the implantation of a device. It was observed that during electrotherapy, the vast majority of patients who had experienced electrical storms (69%) reduced their physical activity. For fear of shock as many as 30% more patients from the first group than from the second group restricted physical exertion (69.0% vs 38.2%,  $p = 0.0017$ ). The median of cumulative physical activity measured with the IPAQ questionnaire in the group of patients with electrical storm, equalling 2952 MET-minutes/week constituted only 64.6% of the median obtained in the group of patients without the storm (4572 MET-minutes/week),  $p = 0.016$ .

In patients who had experienced electrical storm, the average level of depression measured with the Beck Depression Inventory, was  $14.4 \pm 8.8$  and it was 5.8 scores higher than in the rest of patients ( $p$

= 0.0004). In the prevailing majority of patients (78.6%) who had experienced an incidence of electrical storm, also anxiety was observed, resulting from the fear of the incidence of electrical shock ( $p = 0.005$ ). Moreover, the average level of anxiety turned out to be higher in those patients (medians 6 and 0, respectively;  $p = 0.0004$ ). The analysis revealed an equal level of stress in both of the compared groups.

Out of 6 scales of the quality of life analysed in the first part of the NHP questionnaire, the level of as many as 4 of them was significantly higher in the group of patients who had experienced an electrical storm in comparison with the participants who had not experienced this phenomenon.

The most serious problem reported by the patients from the first group was sleep disorders (median 53.5 and 12.6,  $p = 0.009$ ). They were followed by energy (42.4 and 24.0,  $p = 0.034$ ), mobility restrictions (31.6 vs 20.5,  $p = 0.012$ ) and emotional reactions (25.0 vs 8.1,  $p = 7.1$ ).

In the group of patients with the episodes of electrical storms a negative impact of the current health status on housework (59.5%) and on sexual life (57.1%) was observed statistically more frequently in comparison with the frequency observed in the group of participants who had not experienced an electrical storm (in both cases 39.1%;  $p = 0.0037$  and  $p = 0.009$ , respectively).

## Conclusions

1. In patients from the secondary prevention group, in comparison with the primary prevention as an indication for an ICD/CRT-D, the anxiety level is higher and their level of the whole-week physical and social activity is lower. The level of stress does not differ in the analysed groups.
2. Experiencing incidental shocks significantly increases the level of anxiety and leads to the limitation of the whole-week physical activity, but it does not influence the level of stress and depression.
3. The incidence of multiple shocks connected with electrical storm in patients with an ICD/CRT-D reduces the quality of life, increases the level of anxiety and leads to mild symptoms of depression, but it does not affect the whole-week activity of patients.