Electric bicycle – Pedelec - use with a new heart rate controlled training system „HeartGo ®“ in patients with chronic heart failure.

Erik Friedrich, Herbert Löllgen, Helmut Röder, Martin Schlickel, Günter Hennersdorf

**Summary:**

We investigated acceptance and usability of a recently developed heart rate controlled training system (HeartGo ®) in a rehabilitation group according to the german rehabilitation phase III. The group members were 10 patients with chronic heart failure. The study started in 2017 and ended in 2019, lasting two years, according to plan.

The aim of the study was to test the health benefits and training effects of electric bicycles (Pedelecs) in patients with moderate chronic heart failure, NYHA-class II-III, LVEF <= 50% (average 44%). The system with a special bicycle was used for the first time in this setting allowing heart rate controlled trainings by a bluetooth connected smartphone app. The training system tries to hold a preset target heart rate which the group member has to reach and to maintain during the training course.

The group trainings were accompanied by medical staff (physician and paramedic) to avoid cardiac complications, which were not observed during the training course. There were two safety incidents, an episode of an unexplained syncope at the beginning and a bicycle accident at the end of he study.

The intensity of the training was continuously increased according to duration, distance and target heart rate.

Individual heart rate, cyclist power and motor power were measured and saved in an internet portal für later individual and scientific analysis. Clinical and echocardiographic data consisting of left-ventricular ejection fraction LVEF, laboratory data, blood pressure, ECG and stress test observations were also gathered.

As a main result we were able to show a significant 2.5-fold improvement of stress tolerance. Moreover, there were evidences of improvements of LVEF (29% increase), NT-Pro BNP (27% decrease), and systolic blood pressure (11% decrease). Heart rate decreased while cyclists power increasing correspondingly pointing to a marked training effect.

These data from our pilot study with its small numbers and its methodological restrictions suggest that electric cycling seems to be safe for heart failure patients in NYHA classes II and III under controlled circumstances. It clearly provides health benefits and leads to training effects with remarkable improvements of stress tolerance. Fitness in general was clearly improved. Thus under defined safety conditions pedelec training can be recommended for members of cardiac rehabilitation groups, preferably with heart rate control.