

EFFECT OF RESISTANCE TRAINING AND VARIABLE ENVIRONMENTAL CONDITIONS ON SELECTED HORMONAL CONCENTRATIONS AND MUSCLE STRENGTH IN FOOTBALL PLAYERS AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

An increasing number of players are observed to re-injure the ACL, especially among football players. The long post-operative convalescence period encourages researchers to continuously expand their knowledge of epidemiology and, in the case of the post-operative state, to search for agents that could support the healing and regeneration processes of tissues after ACL reconstruction. Training in normobaric hypoxia conditions is an increasingly popular method among players, but there are no reports regarding its use after surgical procedures. The mastery level of players encourages the improvement of the process of restoring fitness to the pre-operative state or higher, which is the main rehabilitation goal.

The aim of the study was to determine the effect of normobaric hypoxia and normoxia, as well as strength training on the reduction of the difference in the peak torque of extensors (AFTP) and flexors (APTZ) of the knee joint of the operated lower limb in relation to the unoperated limb, as well as on the ratio of extensors to flexors (RTPZ). Additionally, changes in the concentrations of selected biological markers were assessed: insulin-like growth factor-1 (IGF-1), growth hormone (GH) and erythropoietin (EPO), which play an important role in regenerative processes.

The study was conducted in a group of 25 football players who underwent arthroscopic reconstruction of the ACL using a graft from the ischial-tibial group. In connection with the obtained results, it can be stated that the greatest significant changes in GH concentration during the intervention occurred between the values before the experiment and the value 30 min after training, respectively in the GHS groups ($p=0.00014$), GNS ($p=0.0001$) and GK ($p=0.0001$). However, the greatest increase in GH concentration was noted in the GHS group.

In the study, statistically significant changes in IGF-1 concentration were observed only in the phase before and 30 min after the completed session in the GHS group ($p=0.00014$).

Analysis of the results regarding EPO concentration allowed for the finding of significant differences only in the GHS group between the results of EPO concentration before and 30 min after training ($p=0.00014$).

Based on the obtained results, it was found that regardless of the group, there were statistically significant differences between the results before and after the experiment for the values of APTP 60°/s, APTP 120°/s, APTP 180°/s and APTZ 60°/s.

It was found that after the experiment, the results of RT 60°/s for the operated limb decreased statistically significantly $p=0.002$. In the case of the results before and after for the healthy limb, no statistically significant differences were found $p=1$.

Keywords: reconstruction, anterior cruciate ligament, rehabilitation, strength training, hypoxia, GH, IGF-1, EPO, PT.