

**COMPREHENSIVE PHYSICAL REHABILITATION AND
PREVENTION OF MUSCULOSKELETAL DISORDERS IN HIGH-
PERFORMANCE CHESS PLAYERS**

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Background. Modern chess is characterized by the extreme intensification of competitive activity. Contrary to popular belief, elite chess players are subjected to pronounced pathobiomechanical stress. Prolonged (up to 6–8 hours) maintenance of a static, asymmetrical sitting posture, combined with psycho-emotional stress and sedentary behavior, triggers the development of persistent muscle-tonic and myofascial pain syndromes. The most vulnerable segments of the musculoskeletal system (MSS) in this cohort are the cervical-thoracic spine ("text neck" syndrome, hyperkyphosis) and the distal parts of the upper extremities (compression-ischemic neuropathies). This not only reduces the athletes' quality of life but also impairs cerebral hemodynamics, directly limiting cognitive functions during the late stages of matches. However, chess-specific rehabilitation protocols remain insufficiently addressed in the literature.

Aim. To develop and pathogenetically substantiate a comprehensive physical rehabilitation program for the correction and prevention of vertebrogenic MSS disorders in highly qualified chess players.

Materials and Methods. The study involved 34 chess players (ranging from Candidate Master to International Grandmaster, mean age: 26.4 ± 3.2 years) with verified manifestations of dorsopathy and muscle-tonic syndrome. The developed 8-week comprehensive rehabilitation program included:

1. *Kinesiotherapy block*: differentiated therapeutic physical culture (TPC) aimed at spinal decompression, strengthening of deep core stabilizers (static-dynamic training), and eccentric stretching of shortened muscles (pectoral and suboccipital muscles).
2. *Manual block*: soft-tissue manual therapy techniques and myofascial release (MFR).
3. *Physiotherapy block*: localized extracorporeal shockwave therapy (ESWT) targeting trigger zones and high-intensity laser therapy (HILT).
4. *Ergonomic block*: individualized kinesio-taping of the cervicothoracic junction and optimization of sitting biomechanics during training.

The efficacy was monitored using the Visual Analog Scale (VAS) for pain, cervical goniometry, stabilometry, and the Neck Disability Index (NDI).

Results. The implementation of the developed protocol resulted in a statistically significant ($p < 0.05$) reduction in pain intensity on the VAS scale, dropping from 6.4 ± 0.8 to 1.2 ± 0.3 points. An increase in the range of active motion in the cervical spine (flexion/extension) by an average of 18.4% was observed. Stabilometric data revealed improvements in proprioceptive control and static balance (a 22.1% reduction in the statokinesigram ellipse area), indicating the restoration of an optimal movement pattern. The subjective NDI score decreased by 46%, correlating with enhanced mental performance and attention span during correction tasks at the 4th hour of simulated cognitive load.

Conclusion. A comprehensive multidisciplinary approach combining targeted kinesiotherapy, manual techniques, and focused physiotherapy demonstrates high therapeutic efficacy in rehabilitating MSS disorders in chess players. The program not only alleviates vertebrogenic pain syndromes but also serves as an ergogenic aid, optimizing the athlete's psychophysiological status under conditions of prolonged, static-dynamic stress. The introduction of the proposed protocol is advisable in the medical support practice for national chess teams during pre-competition preparation and tournament periods.