

ABSTRACT OF THE DOCTORAL THESIS

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Title of the thesis: UTILIZATION OF COMPLEMENTARY KINETIC MEANS IN THE PROPHYLAXIS AND RECOVERY OF SPINE IMBALANCES IN FEMALE GYMNASTS

Keywords: spine, complementary kinetic means, performance, gymnastics.

Performance sports, in general, determine a pathology specific to each sports discipline practiced. The positive effects of physical exercise on the development of musculoskeletal system (locomotor apparatus) have always been known, but its excessive practice under conditions of intensive, competitive, performance-related effort presents a health risk, one of the most affected zones being the spinal column.

Some sports disciplines produce aggressions on the spine by repetitive strain injuries, consequently they are not recommended to those with spinal imbalances. If training includes compensatory exercises to equilibrate the muscle development, the negative impact of demands on both the local and general levels is diminished.

The most common situations are encountered in those sports disciplines which, through their specific technique, require: flexions and extensions of large amplitude, maintaining some positions, working under vibration conditions, exercises that develop the muscles asymmetrically etc. All these generate imbalances in the spine dynamics.

Practical reality relies on data provided by the specialty literature in physical education, sports and kinetotherapy areas, which present the impact of different types of exercise on the vertebral column.

Within the categories “sports with a negative impact” and “sports with a high degree of risk”, one of the nominated sports branches is gymnastics, with all the sub-disciplines composing it, an aspect which determined us to use, as subjects of our study, female athletes practicing performance aerobic gymnastics.

Mainly the female gymnasts have multiple medical problems at the spine level, due to the strains induced by specific motor gestures.

The theme is topical, as the evolution of sports performances requires increasingly intense demands, which implicitly reflect on the functionality of the entire body, particularly the vertebral column.

A special role comes to the recovery program prepared by the physical therapist, which must include exercises for rehabilitating the spine biomechanics and, implicitly, vertebral manipulations that release the accumulated tension, in the case of vertebral compression.

The thesis is structured on 3 parts, as follows:

Part I presents the situation of the theme in specialty literature, which provides the fundamental and scientific background of the research.

Authors such as López Miñarro, P. A., Pfeiffer, R. and Magnus, B. recommend avoiding the spinal postures that may trigger pains and harmful effects over time. They reveal, for each position of the body, the factors that may cause imbalances. Among the postures which are likely to generate certain spine pathologies, we mention: maintained kyphotic posture, cervical hyperextension, cervical hyperflexion, trunk hyperflexion, maximum lateral flexion and lumbar hyperlordosis.

In native specialty literature, one can notice a lack of consistent studies on this topic. Some references were made by Dr. Avramoff, E., in his work “Probleme medico-sportive în gimnastică” (Sports-medical problems in gymnastics), where the author reported that 60% of the investigated female gymnasts had problems affecting their locomotor apparatus.

In national and international specialty literature, due to the fact that performance aerobic gymnastics is a relatively new discipline, there have not been achieved yet sufficient studies on the topic of specific sports injuries. That is why we had to make reference to similitudes encountered in other sports disciplines, such as: dancesport, ballet, artistic or rhythmic gymnastics, for which numerous scientific studies have been made throughout the time.

In gymnastics, the specific effort predisposes to spinal imbalances, which affect more or less the quality of life of the athletes.

Conclusions of part I

- National and international specialty literature, confirmed by our own observations, identifies that injuries and pains in the lumbar spine have the highest incidence in the pathology specific to gymnastics, which can be explained by the motor gestures generating strong tensions at this level.

- In performance sports practice, exceeding certain limits has a negative impact on the health status, because excessive effort generally causes negative changes in the heart morphology and especially exerts negative effects at the local level.

- Back pain occurs more and more frequently in sports activity, being one of the main causes of muscle imbalances due to an improper training method and the adoption of a posture susceptible to generate certain pathologies during the execution of different sports gestures.

- The high prevalence of spondylolysis and spondylolisthesis in athletes suggests that certain sports disciplines predispose to the occurrence of these types of injuries in the lumbar spine.

- In performance aerobic gymnastics, there are specific technical procedures that may cause imbalances in the spinal column, as a result of aggressions at this level, by repetitive strain injuries.

- In performance aerobic gymnastics, one of the most common causes leading to sports injuries is the ground-athlete interaction, but also as the numerous repetitions of various sports gestures specific to this sports discipline, which aim at the accuracy of execution.

Part II includes the preliminary research regarding the identification of spinal imbalances through electronic baropodometry.

Electronic baropodometry represents a specialized technique for the distribution analysis and the measurement of plantar pressure exerted by different somatic structures, using an electronic recording platform. Decisive for the study of foot mechanics, it provides objective data about the distribution of the gravity center of the body and, implicitly, about the possible spinal imbalances.

The preliminary research hypothesis is the following:

We consider that, in the spinal imbalances affecting the female practitioners of performance aerobic gymnastics, the complex recovery program that combines classical and complementary kinetic means is efficient, an aspect that can be objectified through electronic baropodometry.

Preliminary research was conducted at “Dr. Nicolae Robanescu” National Medical Center for Children’s Neuro-Psycho-Motor Rehabilitation of Bucharest, and the investigated subject was a girl athlete practicing performance aerobic gymnastics, aged 14 years, with the diagnosis of dorsolumbar scoliosis.

The athlete was initially assessed through electronic baropodometry, followed by a complex recovery program lasting 45 minutes and combining complementary kinetic means (Shiatsu, Yumeiho and Reflexology). At the end of the session, a final assessment was performed, also through electronic baropodometry, in order to highlight the effects of this complex short-term recovery program.

Conclusions of part II

- Electronic baropodometry represents an efficient tool for monitoring the evolution of imbalances in the spine or pelvis, which provides well-objectified individual profiles.

- Utilization of electronic baropodometry in performance athletes ensures the conditions for achieving a preventive intervention and can be used as a predictor of some injuries due to sports activity.

- After analyzing the results objectified through electronic baropodometry, it has been proved that complementary kinetic means represent an efficient and quick prophylactic and recovery method for improving different spinal imbalances. The working hypothesis of the preliminary research is thus validated.

Part III presents the original contributions regarding the use of complementary kinetic means in the prophylaxis and recovery of spinal imbalances.

The experimental research hypotheses are the following:

1. We assume that the recovery process optimization, in the case of girl gymnasts with spinal imbalances, results from the association of classical and complementary kinetic means, increasing efficiency of the therapeutic act, expressed by improved somatic-functional parameters, a shorter time allocated to recovery and a better quality of life of the girl athletes.

2. We assume that the improvement or recovery of different spinal imbalances can be achieved by developing a complex recovery program which includes complementary kinetic means: Shiatsu, Yumeiho, Reflexology and Qi Gong.

Experimental research was conducted at “Dr. Nicolae Robanescu” National Medical Center for Children’s Neuro-Psycho-Motor Rehabilitation of Bucharest, the investigated subjects being 5 female athletes of the UNEFS Sports Club of

Bucharest, practitioners of performance aerobic gymnastics, aged 14 to 17 years, diagnosed with dorsolumbar scoliosis, lumbar lordosis, neck pain, back pain and low back pain, respectively.

To objectify the efficiency of this complex recovery program including complementary kinetic means, the 5 girls were subject to an initial assessment through electronic baropodometry on 22 February 2012, then they were applied the complex recovery program during a 9-month interval, after which a final assessment was performed on 21 November 2012, in order to highlight the effects of this long-term program.

Assessment methods:

- Electronic baropodometry
- Questionnaires for pain assessment:
 - Roland-Morris Questionnaire - to assess physical disability due to lumbar pain, and
 - Visual Analogue Scale for pain (VAS).

The original contribution of this doctoral thesis is the complex recovery program using complementary kinetic means applied to female athletes practicing performance aerobic gymnastics and its assessment through electronic baropodometry and questionnaires.

Conclusions of part III

- Health status, in the vision of traditional Chinese medicine, expresses the balance between two concepts, Yin and Yang, rooted in the Chinese philosophy and metaphysics. Thus, the disease appears as a result of energy imbalance that occurs due to the excess or the insufficiency of one of the two elements.
- Traditional Chinese medicine considers that restoring the health condition requires to act on the energy imbalances, which generate suffering and disease. This is ensured by specific techniques that bring a supply of energy polarly opposed to the destabilizing tendency and, immediately after, the state of wellbeing and harmony returns progressively.
- Qi Gong, a technique originating in the Far East, is designed so that it influences and transforms all life sectors of the practitioner, according to its basic principles, being compatible with any lifestyle, any performance sport, any age, any health status and any physical preparation level.
- Shiatsu, a complex technique, globally acts on the individual as a bio-psycho-energetic-social system, and specifically, on the sympathetic and parasympathetic

vegetative nervous system, balancing thus the body, in case of physical, mental or emotional tension.

- Yumeiho technique acts through manipulations, stretching and different types of massage on both the physical and energetic components of human being, increasing the athletes' availabilities related to their restoration-recovery capacity, with major implications for the prophylactic and therapeutic act.

- Reflexology represents a holistic therapeutic approach technique, which aims to create a physical-energetic balance of the body, respectively to reduce stress (disease, effort, overtraining etc.) by improving the energetic, nervous and circulatory functions.

- The quick restoration of biomechanical balance in the spine and pelvis, after applying the complex recovery program through complementary kinetic means, validates hypothesis 1, by significantly reducing the time allocated to recovery for the investigated female athletes.

- The symmetrical distribution of pressures on the support polygon, identified at the final testing, indicates the restoration of biomechanical balance of the entire body and, implicitly, the spine and pelvis, an aspect also found in the improvement of somatic-functional parameters. This validates the working hypothesis 1 of the experimental research.

- The plantar pressure equilibration in the 4 sectors of static podogram for the investigated girl gymnasts proves the long-term efficiency of the complex recovery program through complementary kinetic means and results from the alignment of vertebral structure and pelvis bones. This validates the working hypothesis 1 of the experimental research.

- The significant results achieved in both the Roland-Morris Questionnaire for assessing disability due to lumbar pain and the Visual Analogue Scale emphasize that complementary kinetic means represent an efficient method to improve quality of life for the female gymnasts with spinal imbalances. This validates the working hypothesis 1 of the experimental research.

- Analysis and interpretation of the results recorded in the questionnaires for pain assessment have proved the role of complementary kinetic means in the quick and full recovery of the girl gymnasts' health condition, but also in the improvement or recovery of their different spinal imbalances. Hypothesis 2 is thus confirmed.

In order to disseminate the research results, many papers were submitted at different national and international sessions of scientific communications. We shall present only the papers published in prestigious national and international journals.

Papers published in volumes of indexed conferences (ISI Proceedings):

Acasandrei, L., 2015, Theoretical and methodical considerations regarding the spine imbalances in different sports disciplines, Global Journal of Human Social Science, Arts & Humanities – Psychology, Volume XV, Issue 1, Version 1.0, Year 2015, pp.18-23.

Acasandrei, L., 2014, Application of complementary kinetic means to performance aerobic gymnastics.

Under publication: Journal title: Elsevier - Procedia Social and Behavioral Sciences

Acasandrei, L., Bratu, M., Mogâldea, C., 2014, The Qigong utilization for improving the spinal column imbalances in pupils with hearing impairments.

Under publication: Journal title: Elsevier - Procedia Social and Behavioral Sciences

Acasandrei, L., Macovei, S., 2014, Modalities to improve the spinal column dysfunction by using some complementary kinetic means, Journal title: Elsevier - Procedia Social and Behavioral Sciences 117 (2014) pp. 547-552

Macovei, S., Acasandrei, L., Mezei, M., 2013, Computerized electronic baropodometry – A modality to evaluate the spinal column dysfunctions in performance athletes, The 9th International Scientific Conference eLearning and software for education, Bucharest, Volume 3, Quality and efficiency in e-learning, pp. 84-89.

Papers published in other journals:

Acasandrei, L., Macovei, S., 2014, Body posture and its imbalances in children and adolescents, Ovidius University Annals, Series Physical Education and Sport/ Science, Movement and Health, Vol. XIV, ISSUE 2 Supplement, September 2014, 14 (2, Supplement): 354-359.

Acasandrei, L., 2012, Spondylolysis and spondylolisthesis in sports activity, Discobolul – Revista UNEFS de cultură, educație, sport și kinetoterapie, Anul VII, nr. 3 (29), 2012, pp. 44-51.

CONCLUSIONS

- Injuries and pains in the lumbar spine are the most common in the case of female gymnasts, presenting a specific incidence of 86%, according to American authors (Hutchinsen, R.), and 90.5%, according to Spanish authors (Mendizabal, S.). This increased incidence of injuries is due to the fact that movements and activities specific to gymnastic disciplines produce strong tensions on the lumbar area.
- The spine usually supports major tensions throughout the day and that is why one should avoid overloading it. A particularity is represented by sports activity, which, due to the postures that might generate certain pathologies or to the development of excessive muscle strength, creates a background favorable to the emergence of imbalances.
- Female gymnasts may practice this sports discipline without restrictions and with good results if the workouts are appropriate and are doubled by efficient prevention methods and correct treatments, inclusively when gymnasts are experiencing spinal imbalances and back pain.
- Athletes must become aware of their body posture and adopt a correct posture, in order to prevent the emergence of possible spinal imbalances and asymmetries in the body structure, which, if not corrected early, may lead to the onset of certain pathologies.
- Shiatsu technique ensures the energy fluidization along the meridians of the body, stimulating the production of endorphins, substances with a psychotropic and also analgesic role, which offer a sensation of wellbeing, pleasure and relaxation, triggering thus the self-healing mechanisms of the body.
- The objective results recorded through electronic baropodometry and questionnaires for pain assessment proved the role of associating classical and complementary kinetic means in the recovery of spinal imbalances affecting the female gymnasts and the necessity of reassessing the restoration-recovery means specific to physical education, sports and kinetotherapy, by including among them the complementary kinetic means (Shiatsu, Yumeiho, Qi Gong, Reflexology), and not only.

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