

EFFECTS OF ELECTRIC PARAVERTEBRAL MUSCLE RELAXATION PROCESSES IN THE ATHLETES HEART

Sishko D. V.

Tavrisheskiy national university, named after V.I. Vernadskiy

Annotation. Influence of paravertebrals miorelaxation on electric processes in a heart at sportsmen is studied. Paravertebrals miorelaxation was the complex of exercises in a water environment directed on the decline of tone of paravertebral muscles. Before and after it was used of paravertebrals miorelaxation registered the indexes of electrocardiography at the sportsmen engaged in the Greek-Roman fight (n=22) by football (n=24) and heavy athletics (n=25). It is got, that at the sportsmen of engaged in the Greek -Roman fight after paravertebrals miorelaxation QRS and QT were it was increased, and R-R and PQ went down. At the sportsmen of engaged in heavy athletics HR and PQ went down after paravertebrals miorelaxation, R-R, QRS and QT were it was increased. At the sportsmen of getting busy by football the PQ interval shortened, and QRS and QT has multiplied. Findings testify to the presence of different mechanisms of adaptation of the conducting system of heart in the conditions of influencing of paravertebrals miorelaxation. These distinctions are fated by two basic factors: by the functional being of the cardio-vessels system on the whole and functional being of sine knot and conducting system of heart in particular.

Keywords: miorelaxation, electrocardiogram, paravertebral, sportsmen, tone.

Introduction

In certain kinds of sports specific training and competition loads make high demands to supporting motor system of sportsmen, which often exceed reserves of organism. Compensatory hyper tonuses of para vertebral and torso muscles, which develop with it and are formed in zones of de-stabilization and disorders, motor patterns of supporting motor system, result in reduction of muscles' and periarticular tissues' functional state, that, in its turn, reduces general workability of sportsmen's organisms [4]. Reduction of physical workability and sportsman's health in the whole are the results of such disorders, both motor ones and visceral components [9]. From this point of view, elimination of hyper tonus in receptive, projecting zones, restoration of optimal corticopetal afferentation from muscles seems to be perspective for normalization of central control over vegetative components of mio-visceral reflexes. As it is known, there are many methods of mio-tonus normalization [4], increasing of tissue blood circulation, increasing of functioning trophic capillaries' quantity, which leads to more intensive oxygen supply of appropriate tissues [2] and to improvement of muscles coordination ability. At present time, one of the most efficient methods are traction techniques [4]. It has been proved, that traction of C3-Th8, zones' meso-dermal formations, which is carried out by different methods results in reduction of sympathetic influences on heart operation indicators, increase of oxygen content in limbs tissues, improvement of respiratory system's work indicators. However, till present time the question about traction muscles relaxation of C3-Th8 in ware medium influence on electric processes in heart have remained to be unstudied. The research was conducted as per plans of scientific & research works of theory and methodic of physical education department of Tavrisheskiy national university, named after V.I. Verndskiy, state registration No. 0111U000919 "Pedagogical and physiological foundation of physical education system and sports of pupils and students".

Purpose, tasks of the work, material and methods

The purpose of the research is to determine the influence of paravertebral muscular relaxing in conditions of water medium on electric processes in sportsmen's hearts.

Organization of the research. The researches covered Greco-Roman style wrestlers (n=22), football players (n=24) and weightlifters (n=25). The necessity of corrections for sportsmen was conditioned by the presence of hyper tonus of paravertebral muscles, which was registered withy the help of mio-tonus-metering/ The age of sportsmen was from 18 to 25 years old. The period of sports activity was from 5 to 8 years. Exposition of swimming exercises with noodle application was 6 weeks in transitive period of annual training cycle, the quantity of trainings a week was 3 times. With the help of 12 channel computer ECG complex «Cardiolife» indicators of electric cardiogram were registered before and after paravertebral muscular relaxing. Duration of indicators' registration was 5 minutes in the state of rest.

Results of the researches

With studying of influence of paravertebral muscular relaxing we obtained data, which witnessed that electrocardiography indicators of sportsmen from different groups changed variously under the influence of paravertebral muscular relaxing. In the first group (Greco-Roman wrestling) duration of heart cycle (R-R) decreased from 0.938 to 0.844 s. after paravertebral muscular relaxing (see fig.1). The representatives of the 2nd group (weightlifters) manifested practically no change of this indicator. The sportsmen of the 3rd group (football players) showed opposite response – their duration of heart cycle increased from 0.935 to 1.059 s. after paravertebral muscular relaxing. After paravertebral muscular relaxing the reduction time of atrium-ventricle conductivity of heart duration (interval PQ) was showed by sportsmen of all three groups. Concerning sportsmen of the 3rd group, their interval PQ reduced from 0,145 to 0,123 s. (see fig.2).

This indicator of the 2nd group representatives reduced from 0,155 to 0,135 s. Reduction of PQ from 0,159 to 0,110 s. was observed at sportsmen of the 1st group.

Thus, paravertebral muscular relaxing resulted in shortening of time, required for conducting of excitation from atriums to ventricles (PQ) independent on heart beat frequency (HBF). It is known that normal PQ duration varies from 0.12 to 0.20 s. and depends on HBF [10]. The obtained results witness that the quantitative value of this indicator is within normal limits. The absence of dependence between HBF (R-R) and PQ after paravertebral muscular relaxing, probably, is connected with two factors.

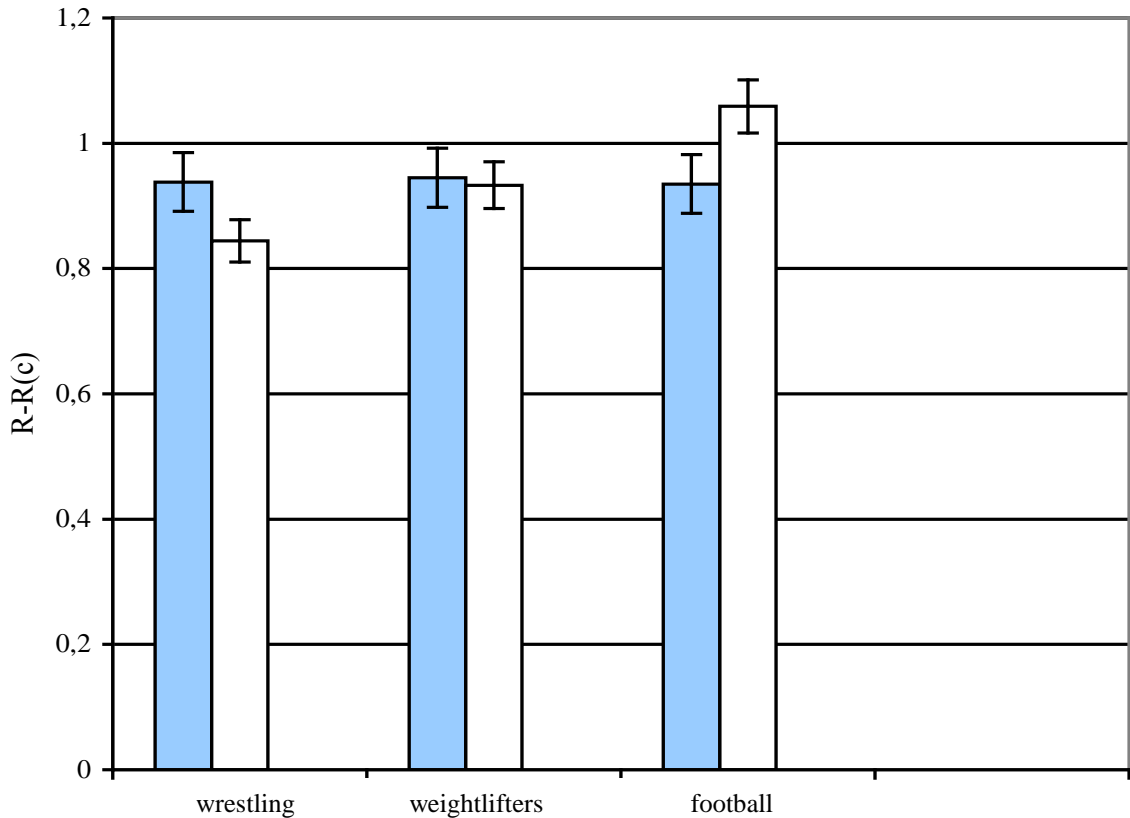


Fig. 1. R-R indicators of sportsmen before and after paravertebral muscular relaxing ■ before after

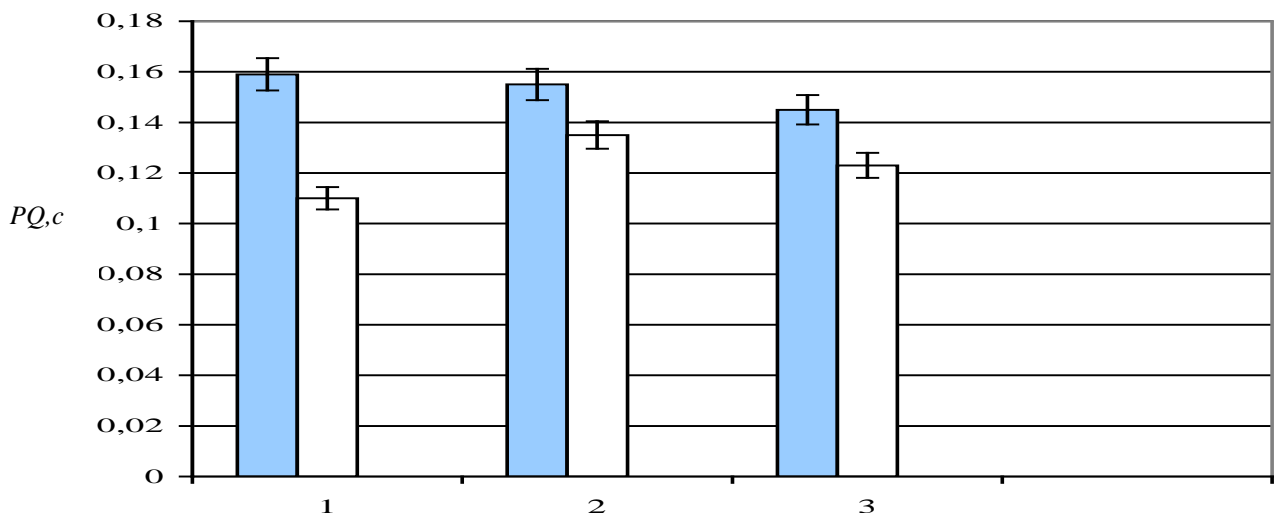


Fig. 2. PQ indicators of sportsmen before and after paravertebral muscular relaxing 1 -wrestlers ; 2 -weightlifters; 3 - football players. ■ before after

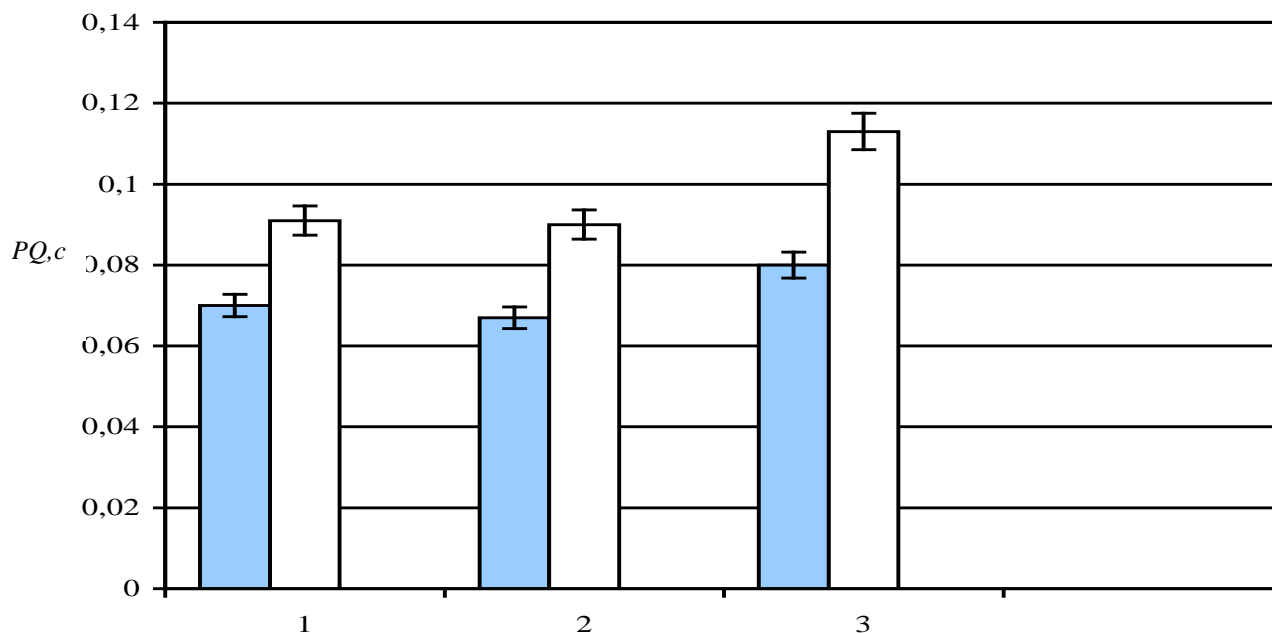


Fig. 3.5. QRS indicators of sportsmen before and after paravertebral muscular relaxing
 - before; - after 1 –wrestlers ; 2 -weightlifters; 3 - football players.

First of the factors is that exercises for stretching of paravertebral muscles are mediated owing to mio-visceral links [154], it is acting as a factor, increasing the speed of electric impulse and, consequently, shortens the time of atrium-ventricle conductivity, while R-R increase of 1st group sportsmen is connected with increasing of electric systole time, covering of ventricles myocardium by excitation and with increasing of diastole. Secondly, linear dependence between HBF and PQ is registered, mainly, in certain range of increasing or reducing of heart beat frequency. QRS increase was actually registered at all three groups after paravertebral muscular relaxing (see fig.3.5). QRS of the 3rd group sportsmen increased from 0,08 to 0,113 s., of the 2nd group – from 0,067 to 0,098 s and of the 1st group – from 0,077 to 0,091 s. It is known that the values of this indicator are from 0,06 to 0,10 s. when they are normal [142; 173]. In our researches QRS indicator was within physiologically normal limits before and after paravertebral muscular relaxing. Only the sportsmen of the 3rd group, whose QRS indicator was 0,113 s. after paravertebral muscular relaxing. It is also known that increase of QRS to 0,11–0,12 s witnesses either about local intra-ventricle blockade or about peculiarities of heart conducting system [5; 6; 7]. QT interval also increased in all groups: from 0,367 to 0,407 s. in the 3rd group, from 0,363 to 0,434 – in the 2nd group and from 0,38 to 0,411 s – in the 1st group. (fig. 3.6). QT increase points at increase of electric systole and time of heart ventricles' covering by excitation [8]. The fulfilled research permitted to formulate the following conclusion. The sportsmen showed individual changes of electrocardiogram indicators after paravertebral muscular relaxing.

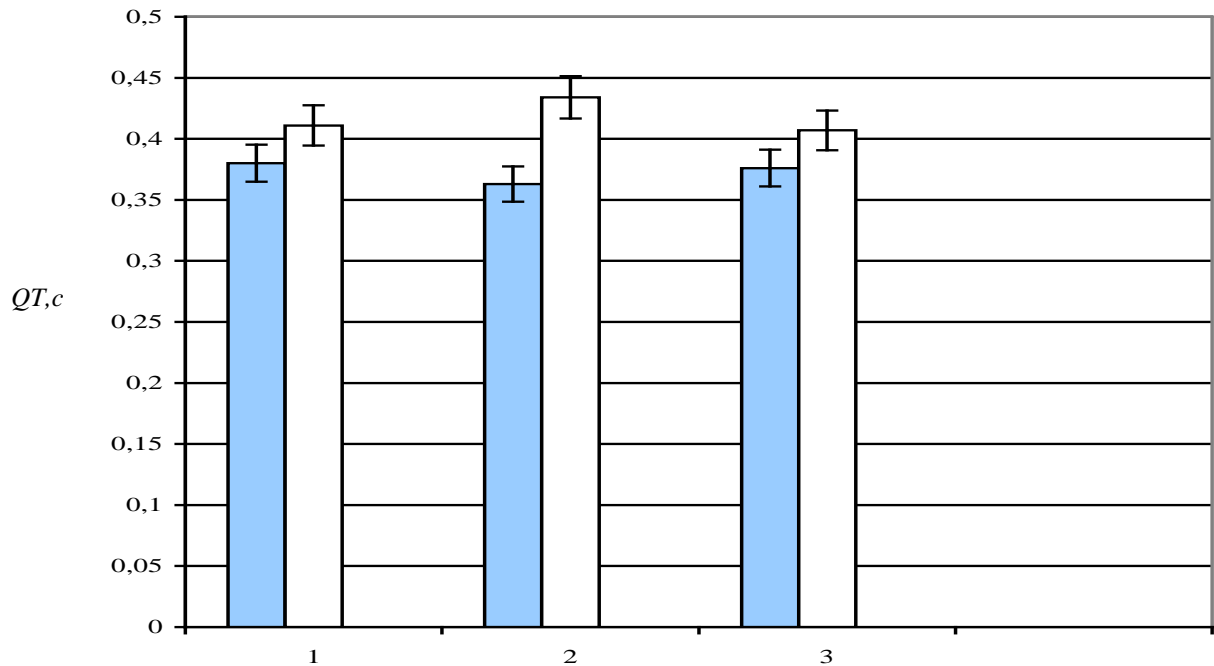


Fig. 3.6. QT_c indicators of sportsmen before and after paravertebral muscular relaxing ■ -before - after; 1 –wrestlers ; 2 -weightlifters; 3 - football players.

After paravertebral muscular relaxing HBF and PQ of 3rd group representatives reduced, R-R, QRS and QT. increased . After paravertebral muscular relaxing HBF and R-R indicators of 2nd group sportsmen did not change. PQ interval shortened, QRS and QT increased.

After paravertebral muscular relaxing HBF, QRS and QT of 1st group sportsmen increased and R-R and PQ reduced. The obtained data witness about the presence of different adapting mechanisms of heart conducting system in conditions of paravertebral muscular relaxing influence. These differences are preconditioned by two main factors: functional state of cardio-respiratory system in the whole and by functional state of sinus and heart conductivity system in particular [1; 3]. Thus, the obtained ECG changes in conditions of paravertebral muscular relaxing can be used as a criterion of traction influences in water medium, in order to optimize functional state of cardio-respiratory system.

Conclusions

1. Paravertebral muscular relaxing, in conditions of water medium, influences on electric processes in sportsmen's hearts. The structure of electric processes' changes depends on the orientation of kind of sports.

2. Individual changes of sportsmen's electrocardiogram were registered after paravertebral muscular relaxing. QRS and QT of wrestlers increased and R-R and PQ reduced after paravertebral muscular relaxing. HBF and PQ of weightlifters reduced, R-R, QRS and QT increased after paravertebral muscular relaxing. PQ interval of football players shortened and QRS and QT increased.

3. The obtained data witness about the presence of different adapting mechanisms of heart conductivity system in conditions of paravertebral muscular relaxing influence. These differences are preconditioned by two main factors: functional state of cardio-respiratory system in the whole and by functional state of sinus and heart conductivity system in particular.

The prospects of further researches. It is stipulated to study the influence of paravertebral muscular relaxing on efficiency of competition activity of sportsmen of different kinds of sports.

References

- 1 Butchenko L. A., Vedernikov V. V., Svetlichnaia V. S. *Teoriia i praktika fizicheskoi kul'tury* [Theory and practice of physical culture], 1986, vol.8, pp. 46 – 47.
- 2 Butchenko L. A., Butchenko V.L. *Teoriia i praktika fizicheskoi kul'tury* [Theory and practice of physical culture], 1998, vol.3, pp. 17–18.
- 3 Podorozhko O. O. *Pedagogika, psihologia ta mediko-biologicni problemi fizicnogo viovanna i sportu* [Pedagogics, psychology, medical-biological problems of physical training and sports], 2008, vol.1, pp. 116-120.
- 4 Maksimova Iu. A. *Pedagogika, psihologia ta mediko-biologicni problemi fizicnogo viovanna i sportu* [Pedagogics, psychology, medical-biological problems of physical training and sports], 2012, vol.12, pp. 75-79.

- 5 Meerson F. Z., Kapel'ko V. I. *Uspekhi fiziologicheskikh nauk* [Successes of physiological sciences], 1978. – T. 9. - №2. – С. 21 – 41.
- 6 Ghanem R. N., Burnes J. E., Waldo A. L. Imaging dispersion of myocardial repolarization. *Circulation*, 2001, vol. 104, pp. 1306–1312.
- 7 Hainsworth R. Reflexes from the heart. *Physiological Researches*, 1991, vol. 71, pp. 617–658.
- 8 Hiroshi Morita. The QT syndromes: long and short. *Lancet*, 2008, vol.372, pp. 750–763.
- 9 Wilmore I. H. *Physiology of sport and exercise*. Human kinetics, 1994, 548p.
- 10 Hevia A. C, Fernández M. M, Palacio J. M, Martín E. H, Castro M. G, Reguero J. J. ECG as a part of the preparticipation screening programme: an old and still present international dilemma. *British Journal Sports Medicine*, 2011, vol.45(10), pp.776-779.

Cite this article as: Syshko D. V. Effects of electric paravertebral muscle relaxation processes in the athletes heart. *Pedagogics, psychology, medical-biological problems of physical training and sports*. 2013, vol.2, pp. 79-83. doi:10.6084/m9.figshare.639248

Information about the author

Syshko D.V.: syshko@list.ru; Tavricheskiy National University; Student str. 13, Simferopol', 97000, Ukraine.

The electronic version of this article is the complete one and can be found online at: <http://www.sportpedagogy.org.ua/html/archiv-e.html>

Received: 21.01.2013
Published: 28.02.2013

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