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## LETTER TO THE EDITOR

**Assessment of spine mobility and a level of pressure pain threshold in judo contestants**

**Évaluation de la mobilité de la colonne vertébrale et du seuil de la douleur de pression chez les judokas professionnels**
**1. Case itself**

A comparison of spine mobility and pain threshold between competitive judo players and their non-trained subjects. The study involved two groups: (1) 30 professionally trained judo athletes in the AZS club of AWF Wrocław, aged  $21.93 \pm 2.2$  (body mass  $79.5 \pm 8.35$ , body height  $186.4 \pm 2.67$ , BMI  $22.8 \pm 1.17$ ) with training experience longer than 3 years and no currently treated injuries, and (2) control group of 30 randomly selected physiotherapy students from the University of Physical Education in Wrocław, aged  $22.43 \pm 1.9$  (body mass  $81.73 \pm 7.39$  kg and body height  $182.87 \pm 5.14$ , BMI  $24.1 \pm 2.17$ ), pain-free and not involved in professional training. Prior to the experiment, all participants were given a complete explanation of purposes and procedure of the study and signed a written consent. The study was carried out according to the principles of the Declaration of Helsinki in 1975 amended in 2000. All procedures were approved of by the Ethical Committee of Academy of Physical Education, Wrocław.

In both groups, the measurement of the range of motion of the spine was performed with Saunders digital inclinometer and the evaluation of compression of the pain threshold was performed with an algometer. The measuring points were: the midpoint of the sacrum, the inter-vertebral space of the twelfth thoracic vertebra and the first lumbar vertebra (T12-L1), the inter-vertebral space of the seventh cervical vertebra and the first thoracic vertebra (C7-T1). The points were determined in the standing position, on hard ground, without shoes, socks and clothes covering the trunk. Inclinometer error margin is  $2.8^\circ$  to  $3.8^\circ$ . Each average of 3 measurements were taken into analysis. All readings were collected by the same researcher and in the same

location. The assessment of pressure pain threshold was performed with a dolorimeter. The measurement was carried out in lying position, on the back, with straight upper and lower limbs lying loosely. The three main measurement points were determined at the level of the first, third and fifth spinous process of the lumbar vertebra (L1, L3, L5). The participants were asked to say STOP at the first sensation of pain. At each measure point, 3 measurements were taken, 10 seconds apart, then the average was calculated. The evaluation of lateralization was also performed (83% right-handed people in group I and 90% in group II).

It was found that group I received a higher range of spine mobility in all sections and planes, except for the rotation in the thoracic-lumbar region. The most statistically significant differences between the two groups were observed for the rotation of the cervical section of the spine towards a dominant upper limb, in the mobility in the frontal plane of thoracic and thoracic-lumbar areas of the spine, Judo athletes were found to have higher pain threshold. Statistically significant differences were also observed in the measurements at the L5 level of the spine on both, dominant and non-dominant, upper limbs (Table 1).

**2. Discussion**

On the basis of the author's own study, higher values of the range of bending in the sagittal plane in the thoracic section of the spine were observed in judo contestants. According to Iwai et al., it may result from the fact that the bending movement of the spine is the basic movement for those who practice this sports discipline. During a judo fight, low positions and lifting an opponent are required from judo contestants [1]. Such actions are repeated many times during training or competitions and may cause an increase of an average range of the spine mobility in the sagittal plane. Such throws as Nege Waza, and, especially Tachi Waza during which the contestant maintains in the standing position while throwing its opponent onto the mat are examples of techniques in which of the motion of spine bending is constantly repeated. Higher values of the rotation in the cervical section of the spine noticed in the group of judo practitioners may result from the fact that special attention

**Table 1** Average values ( $\bar{x}$ ), standard deviations (SD) and the Student *t*-test for the measurement of a pressure pain threshold in the *lumbar* section of the spine in both groups studied (\* $P \leq 0.05$ ; \*\* $P \leq 0.01$ ; \*\*\* $P \leq 0.001$ ).

Variable	Group 1 [N] $\bar{x}$	Group 2 [N] $\bar{x}$
L1d	80.34 ± 26.14	68.73 ± 22.79
L3d	74.77 ± 29.22	67.4 ± 26.41
L5d	84.38 ± 30.25	68.93 ± 26.82*
L1n	81.03 ± 26.03	67.73 ± 25.54
L3n	79.47 ± 28.37	66.6 ± 28.64
L5n	87.98 ± 28.77	65.7 ± 25.19**

L1d: measurement performed 3 cm away from spinous process on the side of a dominant upper limb at a level of L1; L3d: measurement performed 3 cm away from spinous process on the side of a dominant upper limb at a level of L3; L5d: measurement performed 3 cm away from spinous process on the side of a dominant upper limb at a level of L5; L1n: measurement performed 3 cm away from spinous process on the side of a non-dominant upper limb at a level of L1; L3n: measurement performed 3 cm away from spinous process on the side of a non-dominant upper limb at a level of L3; L5n: measurement performed 3 cm away from spinous process on the side of a non-dominant upper limb at a level of L5.

is paid to maintain full mobility within this section of the spine. Maintaining good mobility of the cervical section of the spine is particularly important in the case of throws during which there is a big risk of injuries e.g. the Goshi technique i.e. a throw initiated by movement of the pelvic girdle [2]. A higher range of lateral bending in the thoracic-lumbar section of the spine, which was noticed in the group of judo practitioners, may be related to a relevant length of those muscles, which are responsible for lateral bending of the spine, which is crucial for the throwing technique. A higher average range of lateral bending of the judo contestants in the thoracic-lumbar section of the spine towards a dominant upper limb observed in the author's own research was confirmed in Smaruj's paper [3,4]. The observations prove that, during their attack, contestants more often perform throws from their right side. The only parameter that decreased in judo contestants was a range of rotation in the thoracic-lumbar section of the spine towards a dominant and non-dominant upper limb, which can be caused by overloading of this part of the spine. Judo is a discipline that is characterized by performing a lot of the trunk rotation movements, which, according to Iwai et al. is essential during a fight both in the standing and low positions [1]. These movements may lead to great exploitation of, among other things, quadratus lumborum muscles and in connection with that to an increase in their tension and shortening.

In a community of people who professionally do sport, pain within the lumbar section of the spine is a common problem. According to Okada, it concerns from 30 to 85% people [5]. The term 'pain threshold' is inseparably linked

with pain and is defined as the first sensation of pain after a stimulus has worked. Judo instructors believe that a measurement of spine mobility has great practical implications. Moves, routinely used in judo, can lead to many injuries common. Spine injuries are a result of an improper technique often developed during early years of training. Competitive judo players should maintain full spine mobility, which includes lateral movements as well as trunk rotation. Spine mobility as well as the mobility of the upper extremities deteriorate with time. Our goal should be preservation of mobility [1].

Contestants who practise judo professionally are characterized by greater ranges of spine mobility in most planes and a higher threshold of pressure pain compared to non-practising people.

## Disclosure of interest

The authors declare that they have no competing interest.

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