

EVALUATION OF PAIN IN ATHLETES — SELECTED METHODS

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Abstract. It is generally believed that athletes experience pain in a different way than normally active individuals. Many scientists have confirmed the hypothesis that long-term physical activity can alter the perception of pain, i.e. athletes have a higher pain sensation and pain tolerance thresholds.

The measurement of pain intensity is carried out using subjective methods based on verbal and non-verbal information, describing the clinical characteristics of pain. These psychological methods include the use of scales and questionnaires. Objective methods (thermal, mechanical and electrical) are used only to determine the pain sensation and pain tolerance thresholds.

The specificity and prevalence of chronic pain syndromes have resulted in the increased number of studies on healthy and physically active individuals. It seems that determination of the effects of exercise on the perception of pain might help in the understanding of mechanisms of pain generation.

Key words: pain, measurement methods, athletes, physical effort

Introduction

It is generally believed that athletes experience pain in a different way than normally active individuals. This conviction is not based only on the cases of combat athletes continuing their fights with heavy face injuries; a number of researchers have confirmed that the prolonged physical activity may change the perception of pain, i.e. that athletes have a higher pain sensation and pain tolerance thresholds (Tesarz et al. 2012).

The perception of pain is not only influenced by the strength of stimuli; its character and intensity are modified by a number of factors (psychological state, level of stress, diseases, age, sex, race and culture). Psychological factors seem to be especially significant, i.e. the ability to remain calm and think clearly in adverse conditions (e.g. pain) (Domżał 1996). Some athletes have natural predispositions to such higher psychological resistance to pain, but most sportsmen need to develop it. On the other hand, intense effort results in increased production of endorphins which improve the mood and increase pain tolerance. This often enables athletes to continue the effort that would be too painful at a low endorphin level.

Therefore, research on how athletes experience pain is a good occasion for the evaluation of somatic and psychological effects of regular exercise on pain perception. It may also support the development of exercises, meant to soothe pain and help in sport selection.

However, from the scientific point of view, pain is a subjective phenomenon and a difficult one to quantify. Its perception depends on individual traits and variable circumstances. For example, under high psychological stress, physical pain may be perceived as stronger than usual. In athletes competing at large stadiums, the perception of pain may be elevated by the lack of desired result, pressure of fans or closest associates, or simply a non-optimal condition on a given day.

Furthermore, each attempt to determine the intensity of pain is burdened by an error, resulting from the inability to clearly determine its intensity by an individual. Objective methods are not used for the measurement of pain intensity (for ethical reasons), but only for the determination of pain sensation and pain tolerance thresholds. That is why the methods used for evaluating intensity of pain are subjective, based on communication with the examined individual. Collected verbal and non-verbal information serve to determine clinical characteristics of pain. Individual techniques include verbal, numerical, visual-analog and faces pain scales, and also pain questionnaires (Bonica 1990; Dobrogowski et al. 1996).

Below are the most popular methods of measurement of pain intensity, pain sensation threshold and pain tolerance threshold.

Methods of pain evaluation

Evaluation of pain intensity

The most commonly used scale is the ordinal scale. A tested person uses figures to determine the intensity of pain: 0 – no pain, 1 – mild pain, 2 – bearable pain, 3 – intense pain, 4 – severe pain, 5 – unbearable pain. Importantly, the units are not the “objective” units of pain intensity, i.e. bearable pain is not twice stronger than mild pain.

Numerical scales from 0 to 10 or 0 to 100 points are meant to describe the intensity of pain in a slightly different manner. Zero means that the patient does not feel any pain and the numbers “10” or “100” indicate the worst or strongest pain.

In Poland, the most commonly used scale is the descriptive Visual Analogue Scale (VAS). It is a numerical scale with the 10 cm line where the examined person notes the current pain intensity. The ends of the line denote “no pain” and “maximum pain” characteristics.

In order to determine the intensity of pain, in certain numerical scales, the examined individual is asked to compare the pain to the strongest pain ever experienced by them, regardless of its cause and location. Patients recall the most painful episode in their lives and compare it with the currently experienced pain in the percentage terms (Pyszkowska 1998).

The Faces Pain Scale (FPS) shows different facial expressions depending on the intensity of pain. The scale is used when patients have trouble hearing, speak a different language, have impaired verbal communication, or are treated for dementia. This scale is a numerical scale. An image of a face with a slight smile is assigned a score of 0, while the subsequent face images reflect the intensity of pain on a scale from 2 to 10 points (2 point intervals).

A more complex, multi-element method for measuring pain was developed by a Canadian psychologist Ronald Melzack. His McGill-Melzack Pain Questionnaire (MPQ) consists of four parts referring to the location, nature, frequency and intensity of pain (Melzack 1975). The method uses information about the intensity of pain

contained in sensory, emotional, subjective and mixed descriptions. This questionnaire has proven to be very useful as it enables the quantitative and qualitative assessment of experienced pain. It has been applied not only among patients suffering from pain but also among healthy subjects, including athletes (Tajet-Foxell and Rose 1995; Scott and Gijsbers 1981).

The Polish version of the MPQ was introduced by Szczudlik (Szczudlik 1983). The questionnaire consists of 78 words describing the quality of pain, divided into 20 groups, taking into account four categories: sensory (strength, dynamics and quality of pain), emotional, general and additional (mixed).

In 1984, Szatanik (1985) developed a simplified Polish version of the MPQ (Polish name: AOB). The questionnaire contains 20 words describing the quality of pain in sensory and emotional categories.

Evaluation of pain sensation and pain tolerance thresholds

In psychology, perception of pain is associated with the notions of pain sensation and tolerance thresholds. The pain sensation threshold is the intensity of the sensory stimuli that a person experiences as painful. This value is relatively constant and specific for each individual. This threshold is usually lower among women and the elderly.

Pain tolerance threshold is the maximum intensity of a stimuli that a person can endure. This threshold is not constant and depends on many psychological factors. A higher threshold of pain tolerance can be found among athletes (Guieu et al. 1992; Ord and Gijsbers 2003). In recent years, the number of studies in this area have significantly increased. The results also confirm theories that exercise results in specific changes in pain perception (Egan 1987; Janal et al. 1994; Ord and Gijsbers 2003; Paparizos et al. 2005; Smith 2004; Sternberg et al. 1998; Tajet-Foxell and Rose 1995). Thresholds of pain sensation and pain tolerance are usually determined using thermal, mechanical and electrical methods.

Thermal methods use high and low temperatures as stimuli. The sensation of heat and cold is measured using Peltier (Ruth) stimulators (Fruhstorfer et al. 1976), specialized equipment available at large research centers. A participant is asked to signal the first moment in which pain occurs and the moment when pain becomes unbearable. The test result is given in seconds, i.e. time after which the sensation of pain is reported, and the time at which the test is interrupted by the participant.

Mechanical methods use pressing, stinging, pinching and squeezing, resulting in local ischemia. The measurement is performed using devices such as algometers and dolorimeters that allow for accurate determination of pressure or force that cause pain.

Electrical methods use an electrical impulse to stimulate the exposed body area. Electrotherapy devices are often used in this method. At a fixed frequency, the intensity (mA) of the stimulus increases. Due to the risk of side effects, a threshold value is always determined up to a point beyond which an investigator interrupts the test in the absence of the patient's decision. The numerical value of pain sensation and pain tolerance are indicated by an amperage.

Conclusions

The aforementioned methods of pain evaluation show simple and uncomplicated means of measuring subjective pain intensity, as well as the pain sensation and pain tolerance thresholds.

So far, the scales and questionnaires have been mainly used by physicians in pain diagnostics and determination of the quality of life during illness. However, the effects of pain therapy are still significantly lower than

expected for both patients and researchers. Therefore, research on pain perception among athletes might help to understand the impact of physical activity on pain tolerance in healthy subjects, and thus discover new mechanisms responsible for pain perception.

In addition, the determination of somatic and psychological effects of regular physical activity on pain perception might help in the development of exercises, meant to soothe pain symptoms.

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