APPLICATION OF THERMOGRAPHY AS INJURY PREVENTION METHOD AND MONITORING OF THE INJURY RECOVERY IN ATHLETICS

Sillero Quintana, M, Gómez Carmona, PM, García de la Concepción, MA, Fernández Cuevas, I, Piñonosa Cano, S. Cordente Martínez, CA.

Sports Department. Faculty of Physical Activity and Sport Sciences - INEF, Universidad Politécnica de Madrid

Introduction: Infrared (IR) radiation emitted by the human body depends on blood flow and volume and subcutaneous circulatory metabolic activity of different human body systems (Thomas, Siahamis, Marion, and Boyle, 1992). IR radiation released through a concrete area of the body is directly related to its temperature. Many years ago, infrared thermography was considered as a valid and non-invasive diagnostic method (Barnes, 1967). Modern equipments make possible very accurate and objective recording of the temperature body surface with a single picture that enables to diagnose different pathologies (Gargiola & Giani, 1990), including some musculo-skeletal problems as the lumbar pain (Pichot, 2001). At the moment, pemaSiP, a working group of the Sports Department of the Universidad Politécnica de Madrid is working on the usage of IR cameras in order to prevent injuries and monitoring the recovery process in elite athletes.

Methods: Four thermographic images are taken from each athlete: front and back pictures of the lower and upper limbs, according to the area on risk, with a ThermaCAM TM SC640 (FLIR SYSTEMS, Portland) before starting the training session. Average temperatures of the main muscular groups were calculated from the pictures "ThermaCAM Reporter" software. In addition, the level of nuisance of those areas was assessed every day by a pain scale from 1 (no pain) to 10 (injured). Temperatures were compared with the declared level of nuisance considering three groups (1 = No pain; 2 - 3 = Low pain; > 4 = High pain). At the moment, we are also generating thermographic reports in order to provide the Spanish Athletics Federation medical staff with additional information about the recovery process of the athletes.

Results: ANOVA results point out a direct relationship between the declared level of nuisance of the area and its temperature in both ankles ($F_{[AnkleRight]} = 9.20$; $p < 0.05$ and $F_{[AnkleLeft]} = 3.99$; $p < 0.05$) and knees ($F_{[PosteriorKneeRight]} = 5.34$; $p < 0.05$ and $F_{[PosteriorKneeLeft]} = 9.14$; $p < 0.05$). There were also found significant differences for temperatures (≈ 0.5 degrees) between the painful and non-painful limb on the knee ($F = 14.36$; $p < 0.05$) and hamstring ($F = 3.09$; $p < 0.05$) results. A preliminary report of the first results on thermography as a prevention method will be also exposed.

Discussion and conclusions: From our previous work we have concluded that infrared thermography is a valid, fast and convenient method for preventing injuries in different sports. We suggest that this technique could also be applied to prevent injuries and monitoring the recovering processes in athletes.

References:

- Barnes, R.B. (1967). Determination of body temperature by infrared emission. J. Appl. Physiol. 22:1143-1146.
- Garagiola, U. & Giani, E. (1990). Use of telethermography in the management of sports injuries. Sports Medicine. 10(4): 267-272.
- Pichot, C. (2001). Use of thermography in chronic lumbar pain. Rev. Soc. Esp. Dolor. 8: 43-47.
- Thomas, D., Siahamis, G., Marion, M., y Boyle, C. (1992). Computerised infrared thermography and isotopic bone scanning in tennis elbow. Annals of the Rheumatic Diseases, 51(1), 103-107.