



Disponible en ligne sur

ScienceDirect
www.sciencedirect.com

Elsevier Masson France

EM|consulte
www.em-consulte.com



ORIGINAL ARTICLE

Thermal asymmetries in striking combat sports athletes measured by infrared thermography

Asymétries thermiques en sport de combat, mesurées par thermographie infrarouge

A. del Estal^a, C.-J. Brito^{a,b}, V.-E. Galindo^a,
A. Lopez Diaz de Durana^a, E. Franchini^c, M. Sillero-Quintana^{a,*}

^a Sports Department, Physical Activity and Sports Faculty, Technical University of Madrid, Madrid, Spain

^b Faculty of Physical Education, Federal University of Juiz de Fora, Minas Gerais, Brazil

^c Martial Arts and Combat Sports Research Group, School of Physical Education and Sport, University of Sao Paulo, Sao Paulo, Brazil

Received 16 January 2016; accepted 17 September 2016

KEYWORDS

Thermography;
Combat sports;
Thermal profile;
Asymmetry

Summary

Background. – In striking combat sports athletes, the most common injuries occur in lower extremities and head, and prevention methods are needed to improve athletes' training and competition performance.

Objective. – The aim of this study was to investigate the thermal profile and asymmetries lead vs. rear side in kickboxing and Muay Thai athletes.

Material and methods. – In a transversal design, fifteen athletes of kickboxing and Muay Thai (MT) (age: 23.3 ± 3.4 years, training experience: 4.9 ± 3.4 years, height: 1.8 ± 0.1 m, body mass: 68.1 ± 6.5 kg and BMI: 21.0 ± 1.5 kg/m²) had their temperature measured by infrared thermography (IRT).

Results. – The results indicated symmetry concerning lead vs. rear except by the higher ($P < 0.05$) rear temperature on abdomen ($+0.5^\circ\text{C}$), lumbar ($+0.4^\circ\text{C}$), calf ($+0.4^\circ\text{C}$) ($P < 0.05$) compared to lead, and higher values ($P < 0.05$) for lead shinbone ($+0.4^\circ\text{C}$) and knuckle ($+0.3^\circ\text{C}$) compared to rear.

Conclusion. – We believe that the possible cause of these asymmetries may be the repeated strikes and the specific muscle actions during the combat.

© 2016 Elsevier Masson SAS. All rights reserved.

* Corresponding author. Facultad de Ciencias de la Actividad Física y del Deporte (INEF), C/Martín Fierro, 7, 28040 Madrid, Spain.
E-mail address: manuel.sillero@upm.es (M. Sillero-Quintana).

<http://dx.doi.org/10.1016/j.scispo.2016.09.005>

0765-1597/© 2016 Elsevier Masson SAS. All rights reserved.

MOTS CLÉS

Thermographie ;
Sports de combat ;
Profil thermique ;
Asymétrie thermique

Résumé

Contexte général. – Les blessures les plus fréquentes en sports de combat se produisent au niveau des membres inférieurs et de la tête. La prévention de survenue de telles lésions prend toute son importance à l'entraînement et en compétition.

Objectif. – L'objectif de cette étude était d'évaluer la cartographie thermique corporelle et ses asymétries (parties antérieure et postérieure) chez des sportifs régulièrement entraînés en *kickboxing* et de Muay Thai.

Matériels et méthodes. – Quinze sportifs régulièrement entraînés en *kickboxing* et Muay Thai (âge : $23,3 \pm 3,4$ ans, expérience d'entraînement : $4,9 \pm 3,4$ ans, taille $1,80 \pm 0,10$ m, poids corporel $68,1 \pm 6,5$ kg et IMC $21,0 \pm 1,5$ kg/m²) ont bénéficié d'une cartographie thermique corporelle mesurée par thermographie infrarouge (IRT).

Résultats. – Les résultats ont montré une relative symétrie entre les parties antérieure et postérieure, à l'exception de l'abdomen ($+0,5^\circ\text{C}$), de la région lombaire ($+0,4^\circ\text{C}$), des mollets ($+0,4^\circ\text{C}$; $p < 0,05$) et des poings ($+0,3^\circ\text{C}$; $p < 0,05$), où la température était supérieure sur la face postérieure ; et du tibia ($+0,4^\circ\text{C}$; $p < 0,02$) où la température était supérieure sur la face antérieure du corps.

Conclusion. – Ces résultats suggèrent que les asymétries thermiques antéro-postérieures observées pourraient être liées à la répétition de traumatismes musculaires spécifiques au cours des combats et/ou à des adaptations musculaires propres à ces disciplines.

© 2016 Elsevier Masson SAS. Tous droits réservés.

1. Introduction

Kickboxing and Muay Thai are two very popular striking combat sports that have similar characteristics as the operating principles, as punching and kicking techniques are used [1,2]. To compete successfully in high level in these combat sports, the athlete needs to spend many hours of training developing strength endurance, muscle power, anaerobic and aerobic abilities. However, despite the high physical demands in the training, the presence of injuries can be prevented by performing prevention exercises and the adoption of security measures [3]. Indeed, injury prevention is crucial for the realization of planned training. Gartland et al. [4] observed that injuries in the lower extremities were the most common and head injuries were the second most common between kickboxers. Soft tissue trauma (contusion) was the most common type of injury. These authors observed a prevalence of 109.7 injuries per 1000 fight participations and the most common type of injury occurring to professional kickboxers were head/neck/face (52.5%), and lower extremities (39.8%) over a 16-year period (1985–2001).

The infrared thermography (IRT) allows visualizing the temperature of the body surface in a scale of colors from the infrared radiation emitted by the skin. This depends on the blood flow (quantity of circulating blood) and muscle metabolism which increases the convection of heat to the some area of the body [5]. In sports medicine, the number of investigations is scarce [6] and many papers still focused on case studies [7]. There are observational investigations in soccer [8], swimming [7] and triathlon [7]. In runners, Hreljac [9] observed asymmetry of 1.6°C when the heel with aquilar tendinitis was compared to the unaffected foot. IRT is a safe, non-invasive and low-cost technique [10] that generates a thermogram in which contralateral areas with thermal differences are related to injury risk for the athlete [5]. However, few longitudinal observational data are available in injured vs. uninjured athletes. In this sense, it

is important that specific thermograms are investigated in different sports [7].

Since there is a high prevalence of injuries in kickboxing and Muay Thai [4] and the possibility of using the IRT as a tool to detect the risk of injury, studies that investigate the use of IRT in these combat sports can help coaches and athletes to improve the training sessions organization to decrease injury incidence. However, there are no studies investigating the thermographic profile in combat sports or reporting the presence of asymmetries. Marins et al. [5] indicated that an asymmetry $\geq 0.4^\circ\text{C}$ on the skin temperature of two contralateral areas increases the risk for injuries in athletes. According to Hildebrandt et al. [7], injuries cause changes in blood flow, which can affect the skin temperature, and many medical conditions can cause vasodilation and constriction, hyperfusion, hypervascularization and hypermetabolism, affecting the pattern of skin temperature. Therefore, this study is the first to measure the thermal profile of striking combat sports athletes. The knowledge of thermal profile for each sport is based on the interest and control of singularities that could influence the analysis and lead to misinterpretation if not understood [5]. We hypothesize that the profile of combat sports athletes is characterized by thermal asymmetries between contralateral sides that vary depending on the laterality of the athlete's stance and the specific combat actions of the sport (i.e. lead vs. rear). Therefore, this study measured the thermal profile of the kickboxing and Muay Thai athletes, searching on the relationship of the asymmetries with the individual characteristics of the athlete.

2. Material and methods

2.1. Sample

The sample consisted of 15 male volunteers (4 professional, 3 semi-professionals and 8 amateurs), highly trained in

Download English Version:

<https://daneshyari.com/en/article/5712284>

Download Persian Version:

<https://daneshyari.com/article/5712284>

[Daneshyari.com](https://daneshyari.com)