



7<sup>th</sup> International Scientific Conference

"ANTHROPOLOGICAL AND TEO-ANTHROPOLOGICAL VIEWS ON PHYSICAL  
ACTIVITY FROM THE TIME OF CONSTANTINE THE GREAT TO MODERN  
TIMES"

# DIFFERENCES IN NEUROMECHANICAL CONTRACTILE PROPERTIES BETWEEN ATHLETES FROM WATER AND DRY LAND SPORTS

**Lazar Toskić<sup>1</sup>, Milivoj Dopsaj<sup>2,3</sup>, Dragan Toskić<sup>1</sup>,**

<sup>1</sup> Faculty of Sport and Physical Education, University of Priština – Kosovska  
Mitrovica, Leposavić, Serbia

<sup>2</sup> Faculty of Sport and Physical Education, University of Belgrade, Belgrade, Serbia

<sup>3</sup> Institute of sport, tourism and service, South Ural State University, Chelyabinsk,  
Russia

# Introduction

- Contractile and mechanical properties of muscles – interest to experts in the field of sport, medicine and in other fields
- Tensiomyography – Method for assessment of muscle contractile and mechanical properties
- Water sports physical activities often lead to changes in the musculoskeletal system that are different in regard to dry land physical activities

# **Aim**

The aim of this study is to evaluate the differences in neuromechanical contractile properties of muscles between athletes from water and dry land sports.

# Methods

## *Sample of participants*

- 20 top level male athletes
- Age =  $22.3 \pm 2.8$  years
- 10 water sports athletes (swimmers, water polo players)
- 10 dry land sports athletes (wrestlers, karatekas)

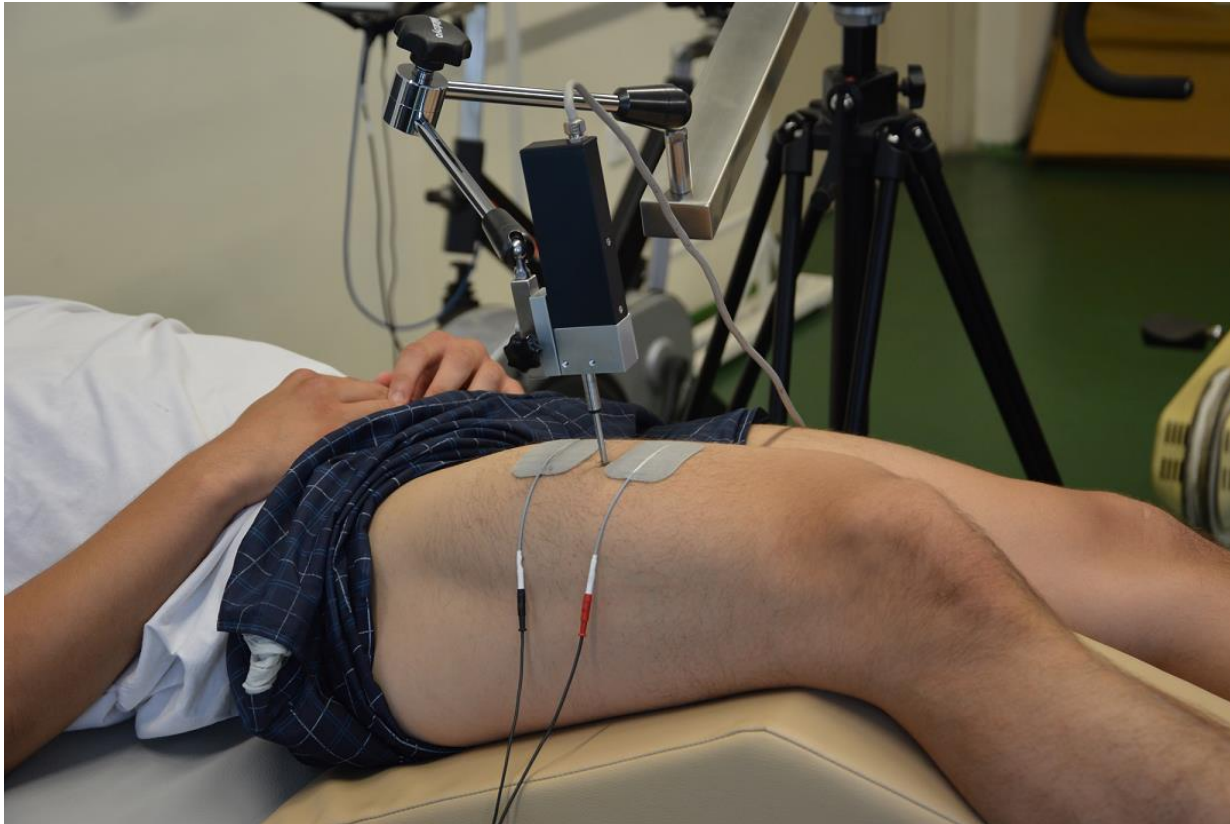
# Methods

## *Testing procedures*

- Tensiomyography (TMG-BMC, Ljubljana)
- Contraction time – Tc (ms)
- Maximal displacement – Dm (mm)
- Rectus femoris (RF), Biceps femoris (BF)
- Dominant leg

# Methods

## *Testing procedures*



**Figure 1:** TMG sensor and electrode placement

# Methods

## *Statistical analyses*

- Descriptive statistics (Mean, SD)
- ANOVA
- MANOVA
- Bonferroni correction
- SPSS 19 (IBM)

# Results

**Table 1:** Descriptive statistics

		<b>RF Tc (ms)</b>	<b>RF Dm (mm)</b>	<b>BF Tc (ms)</b>	<b>BF Dm (mm)</b>
<b>Water sport athletes</b>	<b>Mean</b>	30.571	6.101	37.197	5.437
	<b>SD</b>	3.294	1.173	10.446	1.587
<b>Dry land sport athletes</b>	<b>Mean</b>	26.334	5.462	34.334	5.056
	<b>SD</b>	2.409	1.761	8.092	1.772



# Results

**Table 2:** General difference between groups – MANOVA

	Value	F	Hypothesis df	Error df	Sig.
<b>Wilks' Lambda</b>	0.605	2.119	4.000	13.000	0.136

**Table 3:** Differences between groups in individual parameters – ANOVA

	Type III Sum of Squares	df	Mean Square	F	Sig.
<b>RF Tc</b>	80.772	1	80.772	9.699	<b>0.007</b>
<b>RF Dm</b>	1.837	1	1.837	0.820	0.378
<b>BF Tc</b>	36.865	1	36.865	0.422	0.525
<b>BF Dm</b>	0.654	1	0.654	0.231	0.637

# Conclusion

- Generally, there are no significant differences in muscle stiffness and muscle contraction velocity of the knee flexor and extensor muscles between athletes from water and dry land sports.
- Water sport athletes have significantly lower speed of twitch force generation than dry land sport athletes.
- The influence of dry land and water physical activities on muscle neuromechanical contractile properties are similar.

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**Thank you for your attention!**

