ELECTROMYOGRAPHIC STUDY OF HARM TO MUSCLES IN BASIC LAWN TENNIS MOVEMENTS

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INTRODUCTION: There are few studies of electromyography in relationship to lawn tennis playing. Most of these studies focus on pathologies such as lateral epicondylitis, while there is a lack of studies with electromyography aiming specifically at the kinesiological aspect of the movements of this sport, which is extremely important in training. The m. trapezius (upper fibers), m. pectoralis major (sternocostal portion), m. deltoid (anterior and posterior portion), m. biceps branchii and m. teres major are very important, considering the basic movements of lawn tennis (forehand, backhand and serve). The present study aims to compare the electromyographic activity of these muscles in ten tennis player volunteers and ten non-practitioner volunteers.

METHODS AND PROCEDURES: The m. trapezius (upper fibers), m. pectoralis major (sternocostal portion), m. deltoid (anterior and posterior portion), m. biceps branchii and m. teres major were electromyographically analyzed in 20 young male subjects between 20 and 30 years old. Ten of them were tennis players and the other ten were not. They all performed basic movements of lawn tennis: forehand, backhand and serve. The signals generated by the muscles were recorded using Beckman type surface electrodes and an 8 channel electromyographer Nicolet Viking II and quantified using values RMS (root mean square). Simultaneous with the electromyographical signal captation, two TV cameras were employed, generating an unique image, showing the electromyographic pattern and the person performing the movement.
The volunteer performed the movements guided by the metonomo that delimitated, in each movement, three different phases: beginning, impact and ending. The data obtained were submitted to variance analysis (ANOVA).

RESULTS AND DISCUSSION: The results are showed for each muscle in the table below.

TABLE 1: Comparison of RMS averages between the tennis player and non-practicing tennis player groups.

Muscle	Tennis player	Non-practicing tennis player
TS	63,07*	111,09*
PE	70,05*	8,88*
DA	-**	-**
DP	50,06*	20,01*
BB	51,06*	42,07*
GD	33,37*	10,67*

* Statistically significant difference, ** Statistically non-significant difference

TABLE 2: Averages of electromyographic activity between movement and phase.

Muscle	Backhand		
	B	I	E
TS*	53.07	95.08	112.43
PE**		15.63	
DA*	34.66	65.54	66.25
DP*	14.19	56.01	66.85
BB**		59.38	
GD***		–	

Muscle	Forehand			Serve		
	B	I	E	B	I	E
TS*	94.28	77.93	91.88	109.14	84.43	53.44
PE**		53.24			49.46	
DA*	53.97	119.55	118.46	132.37	93.95	41.43
DP*	44.57	31.23	24.29	32.89	34.75	35.29
BB**		42.25			38.05	
GD**		–			–	

B = Beginning; I = Impact; E = Ending

* There are strong indications that the muscle is affected by interaction between the type of movement and the phase.

**Since no interaction occurred, each factor (movement and phase) should be analyzed separately from the others.

**There are no indications that enable us to assert that the movement, the phase and the interaction might affect the activity in RMS.

CONCLUSION: Based on the electromyographic average figures, there is strong evidence that the non-practicing tennis players show higher electrical activity compared to the tennis players in the m. trapezius (upper fibers). However, the tennis players showed higher electrical activity than the non-practicing tennis players in the m. deltoid (anterior and posterior portion), brachi biceps, peitoralis major sternocostal portion and teres major.

There was no statistically significant difference in the electrical activity between the tennis players and non-practicing tennis players in the m. deltoid anterior portion).

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