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Phantom Pain Intensity in Upper Limb Amputees Using Myo_Electric Prostheses

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Abstract

Every new amputee experiences some sensation in an amputated extremity (Kostuir, 1981). This phantom sensation is initially a painful one (New York University, 1986). In recent decades, the emphasis in upper extremity prosthetic research and development has clearly shifted to externally powered components (Lusardi et al., 2000).

The objective of this research is to study phantom pain intensity in upper limb amputees using Myo_ electric prostheses.

Keywords: Phantom pain; upper limb amputee; Myo_electric prosthesis.

Method

In this research 44 upper limb amputees using Myo_electric prosthesis, were studied. Data collected via standard Prosthesis Evaluation Questionnaire (PEQ). (1998, Prosthetics Research Study Seattle, WA, USA).

Analysis was done by Spss software and statistical tests were as follows:

1. Pearson Correlation Coefficient
2. Regression Model
3. Analysis of Variance (ANOVA)

Introduction

The functional capacity of the upper limb is determined by the shoulder complex, elbow, wrist and hand. This capacity is limited in relation to the surrounding space. Each person with an upper limb amputation is unique and no two amputations are identical (Smith et al., 2004).

70% of patients with new amputation have noticeable phantom limb sensation. Phantom pain is often intermittent, although some amputees report constant discomfort (Lusardi et al., 2000). Successful rehabilitation for people with amputations occurs when each person's individual strengths, challenges and needs are understood (Hubbard et al., 2004). Factors which still exert a strong influence on the expanding use of electric powered systems are 1) technologic advances in actuators, materials and controllers; 2) conceptual advances leading to designs with improved performance; 3) a growing body of experience guiding successive clinical fittings (Smith et al., 2004).

That's why it has been decided phantom pain intensity in upper limb amputees using Myo_ electric prostheses is studied.

PEQ

44 upper limb amputees were studied that all of them were men. The youngest was 8 and the eldest was 50 years old.

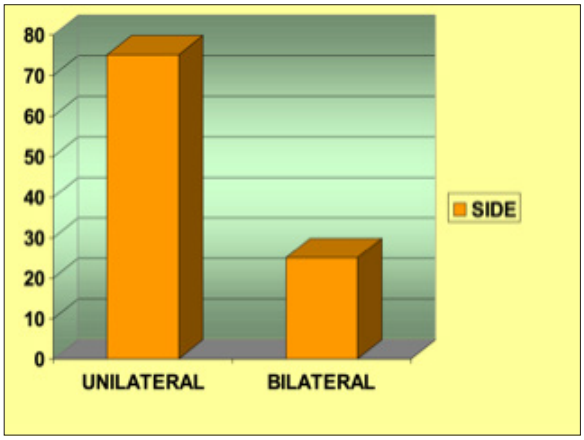

Figure 1: Side of upper limb amputation

Figure 2: Side of unilateral upper limb amputation

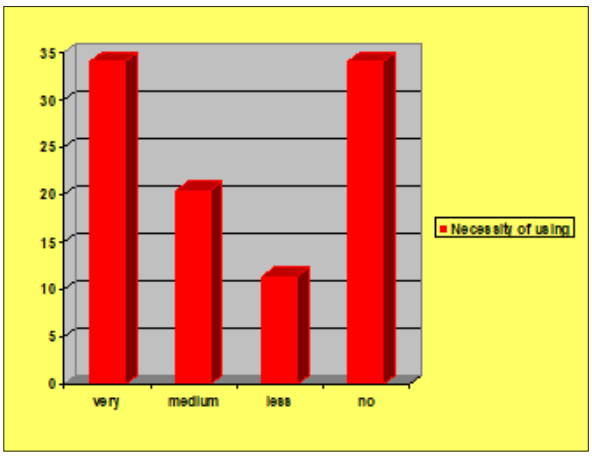

Figure 3: Necessity of using upper limb prosthesis (very, medium, less, no)

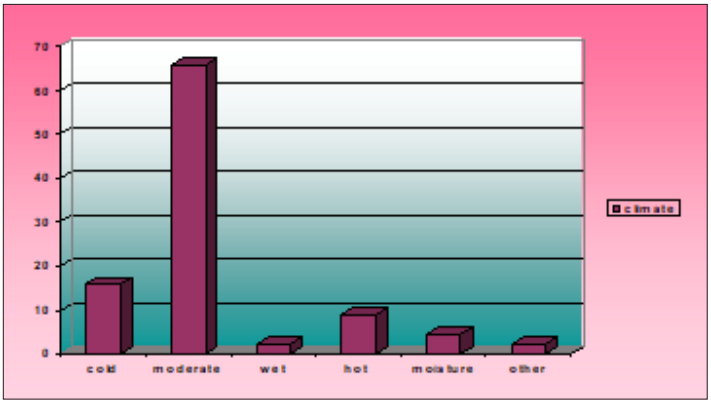

Figure 4: Climate of living place of upper limb amputee (cold, moderate, wet, hot, Moisture, other)

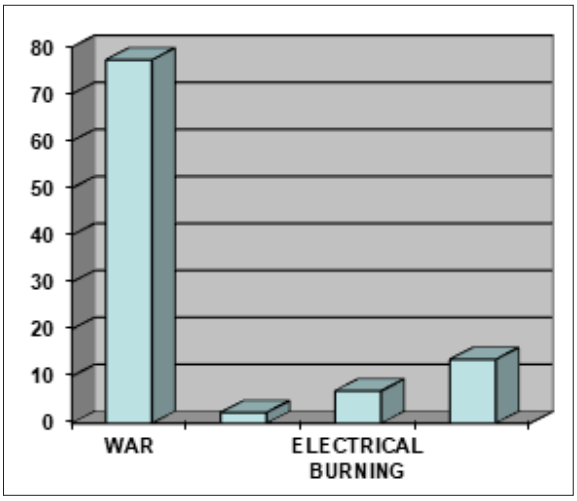

Figure 5: Cause of amputation

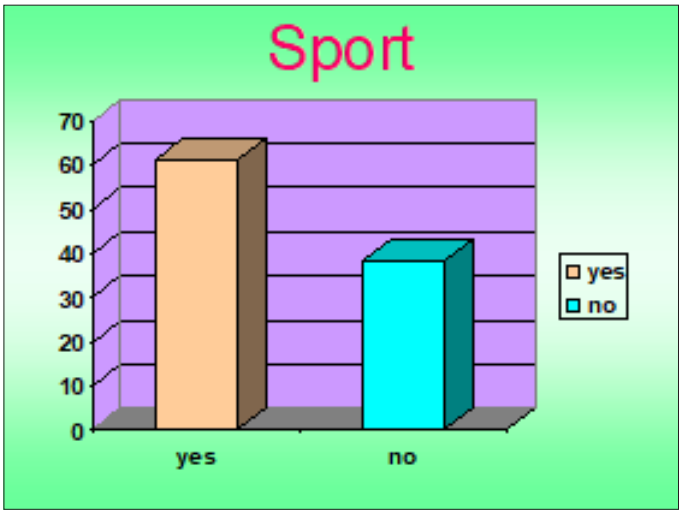

Figure 6: Doing exercise

Spss Software and Statistical Tests

To state the relation between phantom pain with other variables, regression model was used, in which phantom pain was dependent variable and the rest were independent variables. To omit collinearity among independent variables, stepwise model was used and the best model was resulted as follows:

R^2 = 66.4. It means all of the factors in this model 66.4%, explain the changes of phantom pain through stepwise.

Model	Un standardized Coefficients		Standard coeff	t	Sig	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Constant	4.748	1.573		3.019	.005		
Q5	.760	.113	.679	6.756	.000	.775	1.290
Q23	.289	.112	.251	2.574	.014	.819	1.221
Q2	_.520	.125	_.379	_4.145	.000	.937	1.067
Q16	_.387	. 087	_.451	_4.444	.000	.758	1.320
Q10	.431	.106	.436	4.066	.000	.679	1.473
Q11	_.345	.120	_.306	_2.866	.007	.686	1.457

Table 1: Pearson Correlation Coefficient

Model	Sum of squares	df	Mean Square	f	sig
6	334.675	6	55.779	15.151	.000
Regression	136.213	37	3.681		
Residual	470.888	43			

Table 2: Analysis of Variance (ANOVA)

Results

There is direct relation between feeling pain in shoulder area and phantom pain. (p-value= 0.014).

There is direct relation between stump perspiration inside the socket and phantom pain. (p-value=0.00).

There is direct relation between easy donning / doffing of prosthesis and phantom pain. (p-value= 0.007).

There is reverse relation between using prosthesis to don / doff clothes and phantom pain. (p-value=0.00).

There is direct relation between using prosthesis easily, in sitting position, and phantom Pain. (p-value=0.000).

There is reverse relation between stump contact with the inner wall of the socket and phantom pain. (p-value=0.000)

Conclusion

The communication of brain_amputated nerve(s), amputated nerve(s)_amputated muscle(s), brain_amputated nerve(s)_ amputated muscle(s) and vice versa, are followed up and evaluated regularly, by specialist(s). The result is exerted in design and alignment of Myo_electric prosthesis. In unilateral upper limb amputees, evaluation of amputated side is compared with the sound side. In bilateral upper limb amputees, the level of amputation is considered, also.

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