

Phantom limb pain as a predictor of negative dysfunctional emotions in lower-limb amputee patients

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Abstract. Objective: The purpose of this study is to evaluate whether phantom limb pain, body image, activity restriction, psychosocial adjustment and satisfaction with prosthesis helps predict alteration and level of emotional distress among amputee patients. Material and method: The study was an observational, retrospective study. Forty patients, participants aged 63.86±9.63 years; 32 were males (80%) and 8 females (20%), that underwent lower limb amputation during 2014-2017 at the Surgical Clinic II Cluj County Hospital have been evaluated. Measurements were performed using specific questionnaires for assessing the predictor variables (pain in the phantom limb, body image, activities limitation, psychosocial adaptation to the status of amputee and satisfaction with prosthesis) and the outcome variable (dysfunctional negative emotions such as depression and anxiety). Results. Preliminary data show that phantom limb pain and psychosocial adaptation, as independent variables, accounts for 31.6% of variance of the dysfunctional negative emotions and makes a significant contribution to the regression model. On the other hand, body image, activity restriction, or satisfaction with prosthesis were not independently linked to dysfunctional negative emotions. Conclusions. The results show that phantom limb pain and psychosocial adaptation were significant predictor of dysfunctional negative emotions, therefore interventions to reduce or suppress it, have an impact in reducing emotional distress in patients that have undergone lower limb amputation.

Key Words: emotional distress, phantom limb pain, psychosocial adjustment, satisfaction with prosthesis, body image, lower-limb amputees.

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Introduction

Amputation refers to partial or complete loss of an organ or part of the body that occurs as a result of surgery or an accident. The incidence of surgery involving a leg amputation is 11 times higher than that of the upper limb (Stewart et al 1992). Ablative surgery takes place if the limb salvage is impossible (Smith & Skinner 2014; Uustal 2015). After limb amputation, the patient is not only physically and mentally affected, but also the social and family relationships get to be impaired, thus often patients tend to isolate themselves and severely limit their activities. That is why, limb loss may have catastrophic consequences, meaning much more than the loss of a limb, namely the presence of emotional distress (Dadkhah et al 2003). Stress is a physiological or psychological response of the individual and/or the body in a stressful situation (Zlate 2009). On the other hand, emotional distress is defined as a negative emotional reaction, which can include anxiety, depression, fear, anger in response to a stress factor.

Loss of a limb is often felt as painful as losing a partner (Parkes 1972), being associated with the loss of wholeness feeling of the body (Kingdon & Pearce 1982) and increased incidence of mortality. All this can lead to severe emotional distress associated with a poor quality of life (Pell et al 1993; Sinha & Van

Den Heuvel 2011). Loss of a limb is a big stress for the patient, numerous studies certifying this (Horgan & MacLachlan 2004; Solgajová et al 2015). Loss of a limb may cause emotional distress not only from the loss of a body part, but also because of the limitation of activities and roles the amputee can achieve afterwards, being necessary to adapt to the new lifestyle. Loss of a limb favors the occurrence of depressive symptoms in the context of certain risk factors - sense of loss, self-stigma, and difficulties in managing the new status (Durmus et al 2015; Mckechnie & John 2014).

Another risk factor for depressive symptoms is the presence and intensity of pain in the phantom limb (Darnall et al 2005; Desmond & MacLachlan 2006; Skoufa et al 2015). Unfortunately, dysfunctional negative emotions such as depression and anxiety persists 2-3 years after ablative surgery (Singh et al 2009). Post amputation pain in the phantom limb occurs at a rate of 60% - 80% (26), and is defined as a painful sensation felt in the area of amputated limb (Jensen et al 1983; Jensen et al 1985; Manchikanti & Singh 2004; Ribbers et al 1989).

The incidence of emotional distress decreases in the following conditions: after a certain period of time since the surgery, in the context of high social support, prosthetic satisfaction, the

absence of phantom limb pain or in the residual limb (Horgan & MacLachlan 2004).

Prosthetics involves reducing emotional ailments associated with better social integration, so it is important to underline that for prosthesis to be used, it must meet the following criteria: be comfortable to wear, useful and to have a pleasant look. When prosthesis is perceived as useful to carry out certain tasks, that it is used only during some parts of the day and for specific purposes, thus decreasing utility (Ham & Cotton 1991; Millstein et al 1986; Stein & Walley 1983). Using a well-fit prosthesis care reduce both the severity of pain and the depressive symptoms post-amputation (Cansever et al 2003).

In terms of body image, Rybarczk et al (1995) investigated to what extent this aspect and social stigma are perceived as predictors of psychosocial adaptation to the amputee condition identifying body image as an independent predictor of depression, quality of life and satisfaction with prosthesis.

The aim of the present study is to investigate to what extent phantom limb pain, primarily, but also psychosocial adjustment, activity restriction, satisfaction with prosthesis and body image are predictors of emotional distress in patients with an amputated leg.

Materials and Methods

Study design

This was an observational, retrospective, analytical, transversal, cohort study, in which the outcome variable is the level of negative dysfunctional emotions and predictor variables are: phantom limb pain, body image, activity restriction, psychosocial adjustment to the status of amputee and prosthetics satisfaction.

Participants

Study participants were recruited among patients who were hospitalized in Surgery Clinic 2 from Cluj-Napoca, during 2014-2017, that underwent major lower limb amputation. Forty people were selected to participate in the clinical trial. The study participants aged 63.86 ± 9.63 years; 32 were males (80%) and 8 females (20%), most of them coming from the urban area (85%). The inclusion criteria: the presence of phantom limb pain and wearing prosthesis. Exclusion criteria: presence of neurological or cognitive impairment. This study was approved by ethics committee of University of Medicine and Pharmacy "Iuliu Hatieganu" Cluj-Napoca.

Measurements

We used the McGill Questionnaire (MPQ) for measures of phantom limb pain (Melzack 1975, Stein & Walley 1983).

Trinity Amputation and Prosthesis Experience Scale (TAPES) (Gallagher & MacLachlan 2000) was used to evaluate: activity restriction, psychosocial adjustment to the condition of amputee and prosthesis satisfaction. With the help of Amputee Body Image Scale (ABIS) (Breakey 1997) we measured the relative presence of concern regarding body image.

To assess the dysfunctional negative emotions, we used Emotional Distress Profile Scale (PDA) (Opriş & Macavei 2007). It evaluates dysfunctional negative emotions (depression, anxiety), functional negative emotions (sadness, fear) and positive emotions.

In this study only scores of dysfunctional negative emotions have been used.

Procedure

Participants in the study were selected from among patients who underwent amputation of the lower limbs during 2014-2017. They were contacted by phone and informed about the study. All those who wanted to participate signed an informed consent. All participants filled in the self-report scales for assessment of: dysfunctional negative emotions (PDA), pain in the phantom limb (McGill), body image (ABIS), activity restriction, psychosocial adjustment and satisfaction with prosthesis (TAPES). All data collected were subjected to further statistical processing.

Statistical analysis

All statistical analyses were performed using SPSS version 24. The normality of distribution was tested using the Kolmogorov-Smirnov test. Data were characterized by mean and standard deviation. Univariate analysis was performed using the Pearson correlation.

To assess whether predictor variables (pain in the phantom limb, body image, activity restriction, psychosocial adjustment and satisfaction with prosthesis) can estimate the evolution of the outcome variable (dysfunctional negative emotions such as anxiety and depression), a multiple hierarchy analysis regression forced entry was used.

Results

The results of the questionnaires are summarized in table 1.

Table 1. Descriptive analysis for predictor variables and outcome variable

Variable	Mean \pm std. deviation
Negative dysfunctional beliefs	28.15 \pm 5.61
Phantom limb pain	19.62 \pm 9.91
Body image	52 \pm 11.46
Satisfaction with prosthesis	13.77 \pm 6.04
Activity restriction	14.87 \pm 6.02
Psychosocial adjustment	36.95 \pm 7.95

Dysfunctional negative emotions were correlated with phantom limb pain ($r=0.483$; $p=0.002$), psychosocial adaptation ($r=-0.421$; $p=0.007$), and satisfaction with prosthesis ($r=-0.466$; $p=0.002$). They were not statistically significant correlated with body image ($r=-0.210$; $p=0.1$) or limiting activities ($r=0.168$; $p=0.3$). We observed a highly strong correlation between psychosocial adaptation and satisfaction with prosthesis ($r=0.788$; $p<0.002$), and a medium correlation between phantom limb pain and satisfaction with prosthesis ($r=-0.453$; $p=0.002$).

To test the extent to which independent variables that achieved statistical significance in the univariate analysis are predictors of the dependent variable (negative emotions dysfunctional type anxiety) we used a multivariate linear regression analysis (table 2). As satisfaction with prosthesis was strongly correlated to the other two variables, we did not include it in the analysis in order to avoid multicollinearity. We obtained an R^2 of 0.316,

Table 2. Multivariate analysis for negative dysfunctional beliefs

Variables	Unstandardized Coefficients		Standardized Coefficients	t	P
	B	Std. Error	Beta		
(Constant)	31.697	4.521		7.011	<0.001
Phantom limb pain	0.222	0.081	0.391	2.746	0.009
Psychosocial adjustment	-0.214	0.101	-0.303	-2.125	0.04

so our model explained 31.6 of the variance of the dependent variable, and an adjusted R^2 of 0.279. Phantom limb pain and psychosocial adaptation were both independently associated with the dysfunctional negative emotions.

Discussions

Lower limb amputation has a strong negative impact on patient's quality of life and also at the level of social and family relations. It is important for healthcare professionals (physicians, psychiatrists, psychologists) to identify factors that contribute to the onset and maintenance of emotional distress in amputees' patients and to guide their interventions accordingly. The aim of this study was to investigate to what extent a number of predictor variables (pain in phantom limb, body image, satisfaction with prosthesis, activity restriction and psychosocial adjustment) explains the variance of dysfunctional negative emotions (depression and anxiety) and how much progress across the predictor variables affects the latter.

The results show that only phantom limb pain, and psychosocial adjustment, taken independently, explain a significant part of the variance in depression and anxiety (31.6%). These results are consistent with those of previous studies that establish the connection of a significant link between pain and negative emotions (Desmond & Maclachlan 2006; Skoufa et al 2015). Contrary to expectations, other variables predictor (body image, satisfaction with prosthesis, restriction of activity), did not significantly contribute to the variance of dysfunctional negative emotions.

On the other hand, the correlation between dysfunctional negative emotions and independent variables are significant at the higher level of phantom limb pain - consistent with results reported by Skoufa and colleagues (Skoufa et al 2015), satisfaction with prosthesis - similar to the results obtained by Ham and Cotton (1991) and psychosocial adjustment. There was no significant correlation between emotional distress and restriction of activities and concerns related to body image, although previous studies have identified body image as a predictor of depression (Rybarczyk et al 1995).

These data need to be interpreted with caution, considering the fact that the sample size (although statistical analyses show that it is representative for the population) is small. Also, future studies should investigate the nature of the relationship between emotional distress and independent variables with which it has registered significant correlation (satisfaction with prosthesis and psychosocial adaptation to the amputee condition), but they did not explain a significant proportion of variance of dysfunctional negative emotions.

Conclusions

Phantom limb pain and psychosocial adjustment were risk factors associated with dysfunctional negative emotions. It is necessary

to identify other factors that have an impact on the wellbeing of the patient, so that interventions and support given to these patients to be optimal and allow easy and rapid rehabilitation.

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