

Short Report

Psychosocial adjustment to diabetes-related lower limb amputation

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Abstract

Aim To examine psychosocial adjustment in persons with lower limb amputations related to diabetes.

Methods Thirty-eight participants with diabetes-related lower limb amputations, recruited from two limb-fitting centres, completed three psychological self-report assessments: the Trinity Amputation and Prosthesis Experience Scales (TAPES); the Hospital Anxiety and Depression Scale (HADS); and the Amputation Body Image Scale—Revised (ABIS-R).

Results Over 18% of participants scored above the normal range (> 8) for depression on the HADS and 18.5% scored above the normal range for anxiety. Both depression ($\rho = 0.75, P < 0.01$) and anxiety ($\rho = 0.62, P < 0.01$) scores were significantly associated with body image disturbance, as measured using the ABIS-R. Significant relationships were also observed between body image disturbance and three TAPES subscales measuring psychosocial adjustment [general adjustment ($\rho = -0.48, P < 0.01$), social adjustment ($\rho = -0.51, P < 0.01$), adjustment to limitations ($\rho = -0.45, P < 0.05$)].

Conclusions Individuals with diabetes-related amputations may be at elevated risk for psychological distress as a result of their co-morbid medical condition. Regular screening for anxiety and depression and the provision of appropriate follow-up care may therefore be advisable in this population.

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Keywords amputation, body image, diabetes, psychosocial adjustment

Abbreviations ABIS-R, Amputation Body Image Scale—Revised; HADS, Hospital Anxiety and Depression Scales; TAPES, Trinity Amputation and Prosthesis Experience Scales

Introduction

Lower limb amputation is a common sequela of diabetes that can have life-changing consequences for the individual. Approximately half of all lower limb amputations occur in persons with diabetes, although the number of major amputations carried out in this population has decreased in recent years [1,2]. Within 5 years of initial amputation, up to 50% of individuals with diabetes will require re-amputation or amputation of the contralateral limb and mortality rates range from 39% to 68% during this time [3]. Amputation may also affect psychological well-being, as significant associations have

been found with depression, anxiety, social discomfort and body image anxiety [4].

There is a dearth of research examining psychosocial adjustment to diabetes-related amputation. The few studies that have been carried out to date vary in their definition of lower limb amputation (Table 1) and include different patient populations in their control groups, making it difficult to compare findings across studies. Psychosocial adjustment has been operationalized by different researchers as anxiety [5], depression [6], quality of life [5] and perceived health status [7] and a range of instruments has been used to measure these constructs. Furthermore, sample sizes have tended to be quite small (Table 1) and no studies to date have examined body image disturbance as a psychosocial outcome in this population.

A small number of studies have examined the incidence of depression and anxiety in persons with diabetes-related amputations. Carrington and colleagues [5] found that

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Table 1 Sample characteristics of studies examining psychosocial adjustment to diabetes-related amputation

Study	Sample	Amputation laterality	Amputation level
Present study	$n = 38$ persons with diabetes-related amputations	Unilateral or bilateral	Transtibial or transfemoral
Singh <i>et al.</i> , 2008 [8]	$n = 107$ 35 persons with diabetes-related amputations 72 persons with non-diabetes-related amputations	Unilateral or bilateral	Transtibial or transfemoral
Willrich <i>et al.</i> , 2005 [6]	$n = 60$ 20 persons with diabetic foot ulcers/ Charcot foot arthropathy 20 persons with diabetes-related amputations 20 persons with diabetes and peripheral neuropathy	Unspecified	From toe level to transtibial
Peters <i>et al.</i> , 2001 [7]	$n = 124$ 35 persons with diabetes-related amputations 89 persons with diabetes only	Unilateral	From toe level to transfemoral
Carrington <i>et al.</i> , 1996 [5]	$n = 52$ 13 persons with chronic diabetic foot ulcers 13 persons with diabetes-related amputations 26 persons with diabetes only	Unilateral	Transtibial or transfemoral

participants with diabetes-related amputations were significantly more depressed than a control group of patients with diabetes. In a study comparing patients with diabetes-related amputations to those with amputation for other reasons, however, Singh and associates [8] observed no significant difference in the incidence of anxiety or depression, either on admission or at 2-year follow-up. Willrich *et al.* [6] found no evidence of depression among individuals with diabetes-related amputations or those with diabetic foot ulcers. However, the instrument used to measure depression in this study [9] may be inappropriate for use in a diabetic population, because of the inclusion of diet-related items, the responses to which may be influenced by factors related to the condition itself rather than depression.

With regard to measures of general psychosocial adjustment, Carrington *et al.* [5] found that individuals with diabetes-related amputations were significantly less well adjusted than a diabetic control group, as assessed using the Psychosocial Adjustment to Illness Scale (PAIS) [10]. Conversely, Peters and colleagues [7] found no significant differences in psychosocial adjustment between patients with diabetes who had undergone toe or mid-foot amputation ($n = 26$), transtibial amputation ($n = 9$) and those who had not undergone amputation ($n = 89$), as measured using the Sickness Impact Profile (SIP) [11].

In contrast to amputations arising from trauma, individuals who have undergone diabetes-related amputations must continue to cope with their co-morbid medical condition as well as adjust to the amputation itself. Indeed, diabetes has been linked with an increased incidence of depression [12] and anxiety [13]. The impact of amputation on psychosocial adjustment may therefore be even greater for persons with concurrent diabetes. Further research addressing psychosocial adjustment to diabetes-related amputation is needed in order to clarify whether or not this population is at elevated risk for negative psychological

outcomes such as anxiety, depression and body image disturbance.

The aim of the present study was to examine psychosocial adjustment in individuals with diabetes-related lower limb amputations.

Patients and methods

Potential study participants were identified from the patient records of two national limb-fitting centres in Ireland. Individuals aged 18 years or over who had lost a limb and were currently using a prosthesis were considered eligible for participation. A study pack was sent to all potential participants, consisting of a cover letter/information sheet, questionnaire and stamped, addressed envelope. A reminder card was sent 2 weeks later. Consent was deemed to have been given by the participant with the return of a completed anonymous questionnaire. Ethical approval was obtained from the hospital's Research Ethics Committee.

The Trinity Amputation and Prosthesis Experience Scales (TAPES) [14] were employed to assess adjustment to amputation. The TAPES consists of three sections relating to psychosocial adjustment, activity restriction and satisfaction with the prosthesis. The psychosocial adjustment section contains three subscales measuring general adjustment, social adjustment and adjustment to limitations. It contains 15 items in total, each of which is rated on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores are indicative of greater levels of adjustment. The activity restriction section comprises the following three subscales: functional activity restriction, social activity restriction and athletic activity restriction. The 12 items in this section are rated on a 3-point scale (limited a lot, limited a little, not limited at all), with a higher

score signifying greater restriction in activities. Satisfaction with the prosthesis is measured using three subscales: functional satisfaction; aesthetic satisfaction; and weight satisfaction. There are 10 items in this section, each rated on a 5-point scale (1 = very dissatisfied, 5 = very satisfied). Higher scores on these subscales indicate greater satisfaction with the prosthesis.

The Hospital Anxiety and Depression Scales (HADS) [15] is a brief self-report questionnaire consisting of 14 items rated on a 4-point scale and was used in the present study to provide a measure of anxiety (seven items) and depressive (seven items) symptomatology.

The Amputation Body Image Scale—Revised (ABIS-R) [16] was used to measure body image disturbance. It comprises 14 items assessing how an individual with an amputation perceives and feels about his or her body experiences. Examples of items include ‘I avoid looking into a full-length mirror in order not to see my prosthesis’ and ‘when I am walking, people notice my limp’. Items are rated on a 3-point scale ranging from 0 (none of the time) to 2 (most/all of the time), with high scores indicating greater body image disturbance.

Statistical analyses

Data were initially analysed using descriptive statistics. Examination of the data revealed that most study variables did not adequately meet the assumptions of parametric analysis. Consequently, Spearman’s rho correlations were carried out to examine relationships between variables.

Results

Thirty-eight individuals with lower limb amputations related to diabetes participated in the study, with ages ranging from 43 to 85 years (median 68 years, mean \pm SD 66.4 \pm 11.0). Length of time since amputation ranged from 6 to 180 months (median 36 months, mean 40.3 \pm 28.7). Participants reported rates of prosthesis use ranging from 0 to 16 h/day (median 12 h, mean 11.1 \pm 4.5). Sample characteristics are presented in Table 2.

Scores for the outcome measures are summarized in Table 3. Mean scores on the HADS were 4.41 \pm 3.83 for anxiety (median 3.5) and 4.97 \pm 4.11 for depression (median 4). For both measures, seven participants (18.5%) scored above the normal range (i.e. > 8). This compares with rates of 12.6% for anxiety and 3.6% for depression in the general adult population [17]. With regard to amputation type, it was found that persons with unilateral transfemoral amputations had the highest anxiety scores ($n = 5$, median 6, mean 7.2 \pm 4.44), followed by those with unilateral transtibial ($n = 20$, median 3.5, mean 4.2 \pm 3.64) and bilateral transtibial amputations ($n = 7$, median 2, mean 3.0 \pm 3.42). HADS depression scores also appeared to be highest among individuals with unilateral transfemoral amputations ($n = 6$, median 5, mean 5.17 \pm 3.82), followed by persons with unilateral transtibial ($n = 21$, median 4, mean 5.33 \pm 4.66) and bilateral transtibial amputations ($n = 7$, median 4, mean 3.71 \pm 2.43).

Table 2 Socio-demographic and amputation-related characteristics of persons with diabetes-related lower limb amputations ($n = 38$)

Characteristic	<i>n</i>	%
Gender		
Male	29	76.3
Female	9	23.7
Level of amputation		
Below knee	23	60.5
Above knee	6	15.8
Bilateral	9	23.7
Living situation		
With partner	21	55.3
With other family	9	23.7
On own	8	21.1
Employment status		
Retired	23	60.5
Working	3	7.9
Health retired*	8	21.1
Health unemployed*	2	5.3
Unknown	2	5.3

*Participants were retired/unemployed because of their current health status.

Anxiety was significantly correlated with depression ($\rho = 0.62$, $P < 0.01$) and body image disturbance ($\rho = 0.77$, $P < 0.01$), as well as several TAPES subscales [social restriction ($\rho = 0.41$, $P < 0.05$), weight satisfaction ($\rho = -0.39$, $P < 0.05$), functional satisfaction ($\rho = -0.36$, $P < 0.05$), general adjustment ($\rho = -0.48$, $P < 0.01$), social adjustment ($\rho = -0.58$, $P < 0.01$)].

Depression also had a significant relationship with body image disturbance ($\rho = 0.75$, $P < 0.01$) and correlated moderately with most TAPES subscales: functional restriction ($\rho = 0.39$, $P < 0.05$); social restriction ($\rho = 0.54$, $P < 0.01$); weight satisfaction ($\rho = -0.43$, $P < 0.05$); functional satisfaction ($\rho = -0.40$, $P < 0.05$); general adjustment ($\rho = -0.49$, $P < 0.01$); social adjustment ($\rho = -0.49$, $P < 0.01$); and adjustment to limitations ($\rho = -0.44$, $P < 0.05$).

Significant correlations were found between body image disturbance and all three TAPES measures of adjustment [general adjustment ($\rho = -0.48$, $P < 0.01$), social adjustment ($\rho = -0.51$, $P < 0.01$), adjustment to limitations ($\rho = -0.45$, $P < 0.05$)], as well as social restriction ($\rho = 0.44$, $P < 0.05$), weight satisfaction ($\rho = -0.36$, $P < 0.05$) and functional satisfaction with prosthesis ($\rho = -0.46$, $P < 0.01$).

Discussion

The results of this study suggest that individuals with diabetes-related lower limb amputations may continue to experience psychological distress for several years following the loss of their limb. Over 18% of participants scored above the normal range for anxiety and depression, even though an average of almost 3.5 years had passed since amputation. This incidence is notably higher than that found in the general population, particularly with respect to depression [17]. The prevalence of depression and

Table 3 Descriptive statistics for psychosocial adjustment measures

Measure	Subscale	Valid <i>n</i>	Mean	SD	Median	25th percentile	75th percentile	Range
TAPES	General adjustment	36	20.6	3.70	20	18.5	24	10–25
	Social adjustment	34	20.7	3.76	21	18.75	24.25	9–25
	Adjustment to limitation	30	11.1	5.02	10	6.75	14	5–22
	Athletic activity restriction	31	7.5	1.46	8	8	8	1–8
	Functional restriction	30	5.7	2.48	7	4	8	0–8
	Social restriction	34	2.6	2.34	2.5	0	5	0–6
	Aesthetic satisfaction	35	15.4	3.55	16	14	18	4–20
	Weight satisfaction	35	3.4	1.35	4	2	4	1–5
	Functional satisfaction	35	19.6	4.61	20	18	23	5–25
HADS	Anxiety	32	4.4	3.83	3.5	1.25	7	0–14
	Depression	34	5.0	4.11	4	2	7	0–14
ABIS-R	Total score	34	12.8	5.97	12.5	8	16.5	2–27

Mean scores for HADS subscales in a general adult population are 6.14 (SD = 3.76, median = 6) for anxiety and 3.68 (SD = 3.07, median = 3) for depression.

ABIS-R, Amputation Body Image Scale—Revised; HADS, Hospital Anxiety and Depression Scale; SD, standard deviation; TAPES, Trinity Amputation and Prosthesis Experience Scales.

anxiety in this group is also higher than found in patients with mixed causes of amputation using the HADS [18,19], suggesting that individuals with diabetes-related amputations may be at particular risk for psychological distress. Clinicians may need to consider incorporating screening measures for anxiety and depression such as the HADS into routine assessments of this patient group in the years following amputation.

Body image disturbance is a common occurrence following amputation and has been linked with various negative psychosocial outcomes [4]. As amputations related to diabetes are planned surgical procedures and usually occur in a series of steps, with loss of the lower limb often preceded by limb salvage procedures such as partial foot amputations [20], patients undergoing this type of amputation may arguably have more time to come to terms with their altered body image, potentially reducing the impact of body image disturbance on psychosocial adjustment. In the present study, however, body image disturbance was strongly correlated with both depression and anxiety. Although causality cannot be inferred, it is possible that body image disturbance is a risk factor for psychological distress in persons with diabetes-related amputations. Body image also had a significant relationship with the three subscales of the TAPES measuring adjustment and may thus play an important role in how a person adapts to diabetes-related amputation.

The activity restriction model of depressed affect postulates that the relationship between disability and depression is mediated by the extent to which persons are restricted in carrying out activities of daily living [21]. This model has been successfully applied to persons with lower limb amputations [22,23]. Furthermore, public self-consciousness was a significant predictor of activity restriction in this population [23]. The findings of the present study could be interpreted using this model, with social restriction (as measured using TAPES) mediating the relationship between amputation and psychosocial adjustment. Body image disturbance is a similar construct to public self-consciousness and may thus be an

independent predictor of social restriction in the present study sample. Because of the cross-sectional nature of the research and the small sample size, however, it is only possible to speculate as to the nature of the interrelationships between these variables.

Limitations of the present study include the small, heterogeneous nature of the sample, which reduces the generalizability of findings. Furthermore, as participants in the present study used a prosthesis they may not be representative of all persons with diabetes-related amputation, many of whom are either never fitted with a prosthetic limb or rarely wear theirs because of impaired health and/or mobility [24]. The study's cross-sectional design precludes assumptions regarding causality and the lack of a control group prevents comparison with other populations such as patients with diabetes who have not undergone amputation or persons with amputations because of causes other than diabetes. Additionally, the results may be influenced by factors that have previously been demonstrated to impact on psychosocial adjustment [4], including age, presence of co-morbid medical conditions and amputation-related factors such as time elapsed since amputation or amputation level and should therefore be interpreted with caution.

The above results demonstrate that persons with diabetes-related amputations may be at elevated risk for psychological distress because of their co-morbid medical condition. It also appears that body image disturbance may influence the relationship between diabetes-related amputation and psychosocial adjustment. The findings also support the importance of ongoing attempts to reduce the number of diabetes-related amputations that are performed each year through improved diabetes foot care and glycaemic control, which have been found to effectively reduce the need for major lower limb amputations (UK Prospective Diabetes Study, 1998 [25]; Canavan *et al.*, 2008 [1]).

Psychosocial adjustment to amputation is a complex process that fluctuates over time, with distress reportedly being highest at the preoperative stage because of an anticipatory grief reaction to

impending limb loss [4]. Prospective, longitudinal studies with appropriate control groups are therefore required in order to fully elucidate the process of psychosocial adjustment in persons with amputations related to diabetes and to indicate how negative reactions could be prevented or reduced in this population.

Competing interests

Nothing to declare.

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