Depression and Its Associated Factors among Lower Limb Amputees at Hospital Kuala Lumpur and Hospital Sultanah Bahiyah: A Cross Sectional Study

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Abstract

Introduction: Clinical reports have indicated that a significant number of lower limb amputees are experiencing psychological adjustment problems. To date, there is a dearth of studies documenting depression among lower limb amputees (LLA) in Malaysia.

Objective: The objective of this study is to determine the prevalence of depression among LLA and its associated factors.

Methods: This is a cross-sectional study involving 196 LLA who attended the Rehabilitation Medicine Clinics at Hospital Kuala Lumpur and Hospital Sultanah Bahiyah, Alor Setar. Beck Depression (BDI), Multi-Dimensional Perceived Social Support (MSPSS), World Health Organisation Quality of Life Brief Scale (WHOQOL-BREF) and Mini-International Neuropsychiatric Interview (MINI) were used.

Results: 47.4% of LLA had depressive symptoms. 24.5% of these patients were diagnosed to have major depression. The findings revealed depression was associated with younger age, being single, low educational, bilateral side of amputation, trauma as a reason for amputation, absence of prosthesis as type of walking aid, shorter duration of amputation absence of medical co-morbidity among amputees, low social support and poor quality of life. Low perceived social supports and absence of medical comorbidities among amputees emerged as a significant predictor of depression among LLA in multivariate analysis.

Conclusion: Present study demonstrated high percentage of clinical depression in amputees. These findings should encourage those in rehabilitation services to screen for depression in those attending their services to ensure a holistic management in these patients.

Keywords: Lower limb amputation; Depression

Introduction

In Malaysia, the most common cause of limb amputation is diabetes complication [1,2]. A study carried out in Hospital Seremban in 2001 revealed that non-traumatic amputations represented a large proportion (85.8%) of all amputation cases [3]. These cases were mainly associated with diabetic ulcers or gangrene (91%), followed by peripheral vascular disease (7%) and malignancy (2%), while traumatic amputations made up 14.2% [3]. According to World Health Organisation (WHO), 0.5% of the population of a developing country suffer from disabilities following amputation that requires prosthesis or orthosis and related rehabilitation services [4]. This implies that around 160,000 of Malaysia's current population of 32 million need prosthetic or orthotic devices [1].

There are various types of psychological complications that have been seen in the patient who had amputation. The amputees may experiences body images disturbances, anxiety, depression, and post-traumatic stress disorder (PTSD) [5]. Many reviews and studies done to define the prevalence of such problems, especially on depression [6]. Unresolved adjustment problems are long-term issues following limb amputation and it may progress into depression if it is not treated adequately [5].

The prevalence of depression in the amputee and the general population is estimated to be 28% and 3.6-10.6%, respectively [7]. Depression is associated with higher levels of activity limitation, easily having vulnerable feelings, and poorer self-related health [5]. Risk factors for depression among amputees include higher levels of pain as well as anxiety [9]. Pedras reported up to 64% amputees experienced anxiety symptoms following the amputation. When depression is accompanied by anxiety disorders, such as post-traumatic stress disorder (PTSD), higher levels of symptomatic distress and higher rates of suicidal behaviour are reported [10].

The quality of life of a person is likely to be adversely affected following an amputation of his/her body parts. The normal physical activities that this individual used to perform is now curtailed [11-13] conducted studies to compare the quality of life between lower limb

amputees and their healthy counterparts. They found that the quality of life was considerably lower in the former.

Additionally, perceived social supports received by different amputees is crucial in structuring effective treatment plan as a holistic approach in treating these physically disabled patients. Furthermore, in Malaysia, there is no study attempting to establish the associations between depression, perceived social support and quality of life in lower limb amputees.

Hence, the objective of this research is to determine the prevalence of depression and its associated risk factor among the lower limb amputees in the Rehabilitation Clinics at Hospital Kuala Lumpur and Hospital Sultanah Bahiyah, and its association with Quality of Life and Perceived Social Support.

Methods

Study design and setting

This study was a cross-sectional study conducted in Department of Rehabilitation Medicine in HKL and HSB, Alor Setar, Malaysia. 196 subjects were recruited through universal sampling method from the amputee clinic from 1 December 2017 to 31 March 2018. Only those patients who aged at least 18, underwent lower limb amputation, understand Malay or English language were recruited. Those who have intellectual disability, acute medical condition (e.g. delirium) or acute psychosis were excluded.

Instruments

Socio-demographic and clinical profile questionnaire

This questionnaire contained age, gender, race, civil status, employment status, highest level of education ever attained, and household income. Meanwhile, the clinical data comprised of duration of amputation, reason of amputation, involvement of limb either unilateral or bilateral, level of amputation, presence of comorbid medical, surgical or psychiatric illnesses were obtained from the clinical notes.

Beck Depression Inventory-II

The BDI-II consists of 21-items questions [14], range value between 0 to 3 was assigned. BDI has been translated into Malay language and it attains high validity & reliability and well tested [15].

Multi-dimensional scale of perceived social support (MSPSS)

MSPSS was adopted to measure the level of perceived social support. The scale consists of three subscales, namely family, friend, and significant other. Higher score denotes high perceived social support [16]. This scale was translated into the Malay language and its psychometric properties have been established [17].

World Health Organization Quality of Life Assessment (WHOQOL-BREF)

This questionnaire is a 26-item modified version of WHOQOL-100 and has been shown to be a precise, valid and reliable alternative in measuring quality of life [18]. This self-administered scale has been translated and validated in the local context [19].

Mini-International Neuropsychiatric Interview (M.I.N.I)

M.I.N.I is a short-structured interview, which can be used to make a psychiatric diagnosis based on the Diagnostic and Statistical Manual for Mental Disorders-IV and the International Classification of Disorders-10 (ICD-10). The translated Malay version of M.I.N.I has been shown to be reliable and valid in making a diagnosis of MDD based on DSM-IV [15].

Procedure

The approval from the Medical Research and Ethics Committee (MREC) of the Ministry of Health was obtained via the National Medical Research Registry (NMRR) (Protocol no NMRR-17-923-34422).

The patients who attended Rehabilitation Medicine Clinics in HKL and HSB and fulfilled the selection criteria were approached during their clinic visits. They were briefed on the background, objective of the study and were given participant information sheet. A booklet of questionnaires was given to the participants. For those who scored positive for having depressive symptoms on BDI, were then interviewed with M.I.N.I to diagnose for clinical depression.

Statistical Analysis

International Business Machines (IBM®) Statistical Package for Social Sciences (SPSS® version 24) was used for analysis. Descriptive statistics was employed to analyse the socio-demographic and clinical data. Chi square test was used to examine the association between the socio-demographic characteristics with two separate outcomes i.e., using MINI to diagnosed depression and no depression.

The data were further analysed using multiple logistic to find the independent variables that best predict the outcome variable. Independent variables that had significant value during simple logistic analysis and clinically important were subjected to multiple logistic regression.

Results

Socio-demographic and clinical characteristics

196 patients recruited in the study were between 18 and 86 years old with the average age of 55.2 years old (SD=12.29; range=18-86). 2/3 of them were male [Table 1].

Variables	Mean (SD)	Frequency (%)
Age (in year)	55.2 (12.29)	--
Gender		
Male		131 (66.8)
Female		65 (33.2)
Ethnicity		
Malay		109 (55.6)
Non-Malay		87 (44.4)
Religion		
Islam		111 (56.6)

Non-Islam		85 (43.4)
Education level		
No formal education		17 (8.7)
Primary		58 (29.6)
Secondary		103 (52.6)
Tertiary		18 (9.2)
Relationship status		
Single		23 (11.7)
Married		168 (85.7)
Divorced		5 (2.6)
Employment status		
Yes		61 (31.1)
No		135 (68.9)
Occupation Type		
Professional		18 (9.2)
General workers e.g. laborers, maid		21 (10.7)
Housewife		50 (25.5)
Pensioner		56 (28.6)
Cannot work due to illness		21 (10.7)
Others		30 (15.3)
Household Income (RM)	1695.26 (1426.93)	
Financial Aid		
Yes		57 (29.1)
No		139 (70.9)
Involvement of Limbs		
Unilateral		192 (98)
Bilateral		4 (2)
Level of Amputation		
Transpelvic		5 (2.6)
Transfemoral		25 (12.8)
Transtibial		157 (80.1)
Others (trans-pelvic, -femoral & -ankle)		39 (19.9)
Duration of amputation (month)	14.82 (7.87)	
Reason for amputation		
Trauma & accident		34 (17.3)
Diabetic complication		142 (72.4)
Others: Infection, Vascular disease, Malignancy		20 (10.2)

Types of Walking Aid		
Wheelchair		33 (16.8)
Prosthesis		131 (66.8)
Crutches		32 (16.4)
Medical Comorbidities		
Diabetes		97 (49.5)
Hypertension		10 (5.2)
Diabetes and hypertension		45 (22.9)
Malignancy		3 (1.5)
No		41 (20.9)
SD: Standard Deviation		

Table 1: The socio-demographic and clinical characteristics.

Depression among amputees

The mean total score of BDI is 6.79 (SD=10.06). Ninety-three participants (47.4%) reported symptoms of depression and 103 participants (52.6%) reported no depressive symptoms. Among the 93 participants, 21.4%, 8.7%, 13.3% and 4.1% of the participants reported to have minimal, mild, moderate and severe depression, respectively. By using MINI, 51.6% or 48 amputees out of 93 were diagnosed to have clinical depression while 48.4% did not have a clinical depression.

Perceived social support

The Family sub-scale attains a high mean score of 5.9 out a possible 7 (SD=0.91), which denotes a high level of support. On the other hand, the Friend sub-scale has the lowest mean score [5.1; SD=1.33]. The mean of the overall score is 4.44 (SD=1.05), implying that the level of support is moderate.

Quality of life

Results showed the means of all domains are higher than the respective cut off point, which indicate majority of the respondents have high quality of life. Domain 2 (psychological health) acquires highest transformed mean score [61.71 (SD=17.35)] whereas physical health in Domain 1 has lowest mean [57.68 (SD=16.15)] among the four domains.

Univariate analysis of variables associated with depression

There are statistically significant associations between depression and younger age group (x^2=57.68, p<0.01; OR=11.58, 95% CI=3.14-42.65), being single (x^2=13.13, p<0.01; OR=11.36, 95% CI=2.43-52.97) and having secondary educational level and below (x^2=3.97, p=0.04; OR=0.42, CI=0.18-0.99).

There are statistically significant associations between depression and bilateral amputation (x^2=4.09, p=0.04; OR=0.48, 95% CI=0.39–0.60); shorter duration after amputation (x^2=16.77, p <0.01; OR=9.24, 95% CI=2.85-29.91); amputation as a result from trauma (x^2=12.60, p<0.01; OR=5.87, 95% CI=2.09-16.46); absence of prosthesis as walking aid (x^2=7.95, p<0.01; OR=0.29, 95% CI=0.12-.70); and

amputees who had no any medical co-morbidity (x^2=28.53, p<0.01; OR=16.67, 95% CI=15.02-19.1) [Table 2].

Variables	M.I.N.I, N (%)		x^2	p-value	OR	95% CI
	Depressed	Not depressed				
Age						
>45	21 (87.5)	3 (12.5)	17.68	<0.01	11.58	3.14-42.65
>45	26 (37.7)	43 (46)				
Sex						
Male	31 (48.4)	33 (51.6)	0.36	0.55	0.76	0.32-1.84
Female	16 (55.2)	13 (44.8)				
Race						
Malay	28 (51.9)	26 (48.1)	0.09	0.77	1.13	0.50-2.59
Non-Malay	19 (48.7)	20 (51.3)				
Religion						
Islam	28 (50.0)	28 (50.0)	0.02	0.9	0.95	0.41-2.17
Non-Islam	19 (51.4)	18 (48.6)				
Marital status						
Single	16 (88.9)	2 (11.1)	13.13	<0.01	11.36	2.43-52.97
Married	31 (41.3)	44 (58.7)				
Education						
≤ Secondary	33 (58.9.)	23 (41.1)	3.97	0.04	2.42	0.18-0.39
> Secondary	14 (37.8)	23 (62.2)				
Employment						
Employed	21 (58.3)	15 (41.7)	1.43	0.23	1.67	0.72-3.88
Unemployed	26 (45.6)	31 (54.4)				
Income						
<5000	45 (50.6)	44 (49.4)	0	0.98	1.02	0.14-7.58
≥5000	2 (50.0)	2 (50.0)				
Financial Aid						
With	14 (38.9)	22 (61.1)	3.19	0.07	4.63	0.20-1.09
Without	33 (57.9)	24 (42.1)				
Involvement of Limb						
Unilateral	43 (48.3)	46 (51.7)	4.09	0.04	0.48	0.39-0.60
Bilateral	4 (100.0)	0 (0.0)				
Amputation Level						
Above Knee	13 (59.1)	9 (40.9)	0.84	0.36	1.57	0.60-4.14
Below knee	34 (47.9)	37 (52.1)				

Duration of amputation						
<6 months	22 (84.6)	4 (15.4)	16.77	<0.01	9.24	2.85-29.91
≥6 months	25 (37.3)	42 (62.7)				
Reason for amputation						
Trauma	22 (78.6)	6 (21.4)	12.6	<0.01	5.87	2.09-16.46
Medical cause	25 (38.5)	40 (61.5)				
Types of Walking Aid						
Prosthesis	13 (33.3)	26 (66.7)	7.95	<0.01	0.29	0.12-0.70
Non-Prosthesis	34 (63.0)	20(37.0)				
Medical Comorbidities						
No	29 (87.9)	4 (12.1)	28.53	<0.01	16.67	15.02-19.1
Yes	18 (30.0)	42 (70.0)				
MINI: Mini-International Neuropsychiatric Interview; χ^2: Chi Square; OR: Odds Ratio; CI: Confidential Interval						

Table 2: Univariate analysis of depression with the sociodemographic and clinical characteristics (n=93).

Univariate analysis of depression and MSPSS's score

Analyses showed that those who are depressed have poorer social support as compared to those who are not depressed, and it is statistically significant (p<0.01). Results also showed that they have statistically significant poorer social support in all of the sub-scales in MSPSS; Significant others (χ^2=24.94, p<0.01); family (χ^2=6.28, p<0.01); friends (χ^2=34.56, p<0.01) as compared to those who are not depressed [Table 3].

MSPSS	**M.I.N.I, N (%)**		χ^2	**p-value**	**OR**	**95% CI**
	Depressed	**Not Depressed**				
Total						
Low	22 (95.7)	1 (4.3)	24.88	<0.01	39.6	5.03-311.57
High	25(35.7)	45 (64.3)				
Sub-scale 1						
Low	20 (100)	0 (0)	24.94	<0.01	2.7	2.00-3.65
High	27 (37.0)	46(63.0)				
Sub-scale 2						
Low	6 (100)	0 (0)	6.28	0.01	2.12	1.70-2.65
High	41 (47.1)	46 (52.9)				
Sub-scale 3						
Low	32 (88.9)	4 (11.1)	34.56	<0.01	22.4	6.78-74.00
High	15 (26.3)	42 (73.7)				
Sub-scale 1: Significant Others; Sub-scale 2: Family; Sub-scale 3: Friends; MINI: Mini-International Neuropsychiatric Interview; MSPSS: Multidimensional Scale of Perceived Social Support; N: number; χ^2: Chi Square; OR: Odd Ratio; CI: Confidential Interval						

Table 3: Univariate analysis of depression and MSPSS's score of amputees (n=93).

Univariate analysis of depression and WHOQOL-Bref

In general, those who were diagnosed to be depressed by M.I.N.I tend to have lower quality of life. Statistically significant association are found between depression and physical health (χ^2=51.21, p<0.01;

OR=131.25, 95% CI=16.28-1058.25); Psychological Health (χ^2=59.1, p<0.01; OR=190.0, 95% CI=23.02-1568.15); Social Relationship (χ^2=30.04, p<0.01; OR=51.14, 95% CI=6.50-402.34); and Environment Domains (χ^2=47.75, p<0.01; OR=4.07, 95% CI=2.62-6.31) [Table 4].

QOL	M.I.N.I, N (%)		χ^2	p-value	OR	95% CI
	Depressed	Not depressed				
Domain 1						
Low	35 (97.2)	1 (2.8)				
High	12 (21.1)	45 (78.9)	51.21	<0.01	131.25	16.28-1058.25
Domain 2						
Low	38 (97.4)	1 (2.6)				
High	9 (16.7)	45 (83.3)	59.1	<0.01	190	23.02-1568.15
Domain 3						
Low	25 (96.2)	1 (3.8)				
High	22 (32.8)	45 (67.2)	30.04	<0.01	51.14	6.50-402.34
Domain 4						
Low	32 (100)	0 (0)				
High	15 (24.6)	46 (75.4)	47.75	<0.01	4.07	2.62-6.31
Domain 1: Physical Health; Domain 2: Psychological Health; Domain 3: Social Relationship; Domain 4: Environment; MINI: Mini-International Neuropsychiatric Interview; N: Number; χ^2: chi square; OR: Odd Ratio; CI: Confidential Interval						

Table 4: Univariate analysis of depression with the score of WHOQOL-BREF of amputees (n=93).

Multiple logistic regression

Absence of medical co-morbidity (adjusted OR: 50; 95% CI: 0.0, 78.21; P= 0.03) and low perceived social support (Adjusted OR: 26.45;

95% CI: 1.38, 506.02; P=0.03) emerged as a significant predictor of depression among lower limb amputees in this study [Table 5].

Variables	Wald	p-value	SE	Adjusted OR	CI
Age	0.21	0.65	2.77	0.28	0.00-64.07
Marital status	2.97	0.09	3.28	286.8	0.46-1780.38
Education level	2.69	0.1	1.48	0.09	0.00-1.61
Level of Amputation	0.16	0.69	1.12	1.57	0.18-14.04
Duration of Amputation	2.8	0.09	1.13	6.59	0.72-59.93
Reason for Amputation	0.1	0.75	1.81	1.77	0.05-60.81
Walking Aid	3.33	0.07	2.78	0.01	0.00-1.46
No Medical Co-morbidity	4.67	0.03	1.89	50.07	0.00-78.21
MSPSS	4.73	0.03	1.51	26.45	1.38-506.02
MINI: Mini-International Neuropsychiatric Interview; MSPSS: Multidimensional Scale of Perceived Social Support					

Table 5: Multiple logistic regression analysis of the associated factors for BDI.

The model summary had indicated 66.2% of the variation in the dependence variable is explained by the logistic model (Cox-and-Snell

R^2 0.66). Nagelkerke R^2 value of 0.878 revealed the strong relationship between the predictors and prediction (M.I.N.I).

Discussion

Prevalence of depression

The prevalence of depression in the amputee population was higher than those in the general population according to most of the studies [6,20]. In current study, the mean BDI score was 6.79 (SD=10.06). By using BDI, 47.4% respondents reported symptoms of depression (BDI score >1). Out of 93 subjects who exhibited symptoms of depression, 48 of them (51.6%) were having clinical depression by using the structured interview, M.I.N.I. To date, there is no study regarding depression among amputees in Malaysia. This prevalence is consistent with other Asian study [6] and earlier studies [21]. Sahu et al. [22] also reported that the prevalence of depression ranged from 10.4-63%. Other international studies have reported depression rates of between 20-66% in the years after amputation [23]. Depression is prevalent among amputees especially among LLA due to pain, prosthetic avoidance, lack of social support, a pessimistic outlook on life and a negative body image [23]. Furthermore, one of the greatest challenges for a person after having an amputation is societal stigma [24]. People who underwent an amputation may have low self-esteem and viewed themselves as incomplete individuals because they were missing a part of their body [25].

Association between depression and sociodemographic factors

In the current study, the risk for depression was higher in the younger age group than in older age group. This finding is comparable with those of earlier studies, where the younger amputees are more likely to develop depression more than their older counterparts [26]. It is plausible that activity restrictions among the younger age group invariably lead to depression. For one, the younger amputees are usually more active physically than the older ones before amputation.

Other studies also reported that older amputees had a better mental adaptation to amputation than their younger counterparts [27]. Furthermore, older adults whose amputations were caused by diabetic complications were less depressed because they had more time to deal with it and found sufficient resources to cope with their psychological adaptation [28]. If the amputation occurs when one is younger, it could be more challenging to adapt [26]. However, there are several studies emphasising the existence of positive correlation between depression and the subjects' age at the time of amputation [29]. Older amputees tend to have other medical comorbidities that could enhance psychological adaptation and mitigate depression.

Majority of the previous studies consistently showed that being married could be a protective factor for depression [30]. This means that married people tend to be less depressed than those who are unmarried. The finding of this study is almost similar with that of Darnall [8] which revealed that those subjects who were at the time of or soon after the amputation either divorced or separated were more likely to develop depression. In describing the effect of marital status on depression, it might also be said that the social relationships are more limited in people suffered from amputation compared with others, thus marriage plays a vital role in their mental health [27].

In this study, depression was found to be also associated with the level of education. The results are comparable with the previous studies which reported that amputees with lower education were more depressed [31]. Education plays an important role for a person to get better job and indirectly to get better income. Furthermore, higher education is a protective factor against depression [32]. Lower education status is associated with depression [33]. Although there is no study in Malaysia to look into association of depression and educational level among amputees, in general, depression was higher among those with just secondary school education or less [34].

Association between depression with clinical variables

Amputees who had to undergo bilateral amputations exhibited higher tendency for depression. A patient who suffers bilateral amputation faces more challenges in using a walking aid than one with unilateral amputation. Ambulation after bilateral LLA requires the patients to expend a large additional energy. The energy need of the individuals with bilateral lower limb amputations has been estimated to be nearly three times more than that for unilateral amputation [35]. Consequently, patients who had undergone bilateral amputation had a poorer chance of being able to walk again than those who had unilateral amputations

There was no statistically significant relationship between level of amputation and depression. The plausible reason could be that in this study, the proportion of subjects who have had above-knee amputation is smaller than those with below-knee amputation. Unlike in this study, Yilmaz [36] found that trans-femoral or above-knee amputation tended to cause depression more than trans-tibial or below knee amputation. The reason behind this phenomenon could plausibly be similar to those who underwent bilateral amputation. That is, more energy is needed by the amputees to walk when the amputations are trans-femoral [35].

It was shown that the time-lapse since amputation is another factor that has an impact on depression. Specifically, the current study shows that a person who has been amputated long time ago (more than six months) is more likely to be less depressed than one who has only been recently amputated (x^2=16.77, p<0.01; OR=9.24, 95% CI=2.85-29.91). This is consistent with the previous studies, which stated that the amputees tended to be more depressed during the earlier phase post amputation as compared to those who has had time to adjust with the amputation [37]. The plausible explanation for this was that new amputees were incapable and struggling to adapt with their new physical challenges, coped with unresolved grieve and possibility of intractable pain.

Reason for amputation was found to be significantly associated with depression (x^2=12.60, p<0.01; OR=5.87). In this study, the participants who underwent LLA as a result of trauma were found to be more depressed than those amputated for medical reason. It was highly likely that majority of the participants who had trauma for amputation were from the younger age group as well as from the working population. Another explanation why traumatic amputation tends to result in a more serious depression is that doctors who treat these patients have limited time to explain the need for amputation [27]. Amputations are performed as a lifesaving procedure in patients with limb traumatic injury. On the other hand, for patients whose amputations are due to dysvascular disease, there is ample time for pre-amputation counselling. Hence, the subjects may exhibit fewer depressive symptoms after the amputation due to adequate mental preparation preoperatively.

Presence of medical comorbidities was generally presumed to be associated with depression. Nonetheless, this study found that those who had no depression were at higher risk to develop depression (x^2=7.95, p<0.01; OR=16.67). It is noteworthy to acknowledge that

majority of the subjects with clinical depression were from the younger age group and had amputation due to trauma. On the other hand, individuals suffering from chronic debilitating medical comorbidities e.g. ischemic vascular leg ulcer may view amputation as a way out from suffering. The quality of life may subsequently improve following the removal of the sources of suffering [38]. On the contrary, losing limbs due to trauma injury in a previously fit and healthy individual would place them at considerably risk of depression as their quality of life would almost certainly decline [39].

This study reported that amputees who were not using prosthesis as walking aid were more depressed than those who used prosthesis. Prosthesis can help amputees tangibly by enhancing mobility and independent functioning of the lost limbs [40]. Without prosthesis, many activities would have been curtailed and the disability continued to hinder other related functions. Thus, the presence of a prosthesis might be an important mediator between disability and emotional well-being [5].

Association between depression and perceived social support

In this study, the overall perceived social support reported by the respondents was at a moderate level. However, family support was high. This finding is in tandem with several other studies in Asia, Malaysia included, which also found that the main source of support came from family, followed by friends and significant others [41,42]. Further, perceived social support variable was found to be associated with depression in this study. It is noteworthy to mention that 'families' offer highest support to amputees compared to the 'significant others' and 'friends'.

It is noted that social supports are needed by the amputees to help overcome challenges and obstacles following amputations [43]. Accordingly, Unwin [44] emphasized the importance of examining the social support and hope in the lower limb amputees, as these factors are the major predictors of positive mood and hence protecting them from depression.

Association between depression and quality of life

Among the four domains of QoL, the physical domain in this study scored the lowest (57.68). The result of the present study was comparable with the recent Malaysian study on QoL [45]. Understandably, the amputation causes restriction to the patient's physical mobility. Being able to mobilize was a significant factor to good or poor QoL in lower limb amputee [46].

Present study revealed that poor QoL was associated with depression. LLA was a serious health problem that has considerable negative effects on the patients' QoL [47,48]. There were multiple causes leading to poor QoL, and functional limitation was one of the common consequences following amputation [49]. Due to this limitation, psychological impact such depression would ensue.

Limitations

There were a several limitations in this study. First, this was a cross-sectional study that employed non-probability sampling method. Secondly, other psychological adaptation and reaction that can influence the results of the study such as anxiety, post-traumatic stress disorder, and body image disturbances are not included. Lastly, the confounders that possibility affects the measurement such as level of pain, coping skills, prosthesis satisfaction and also subject's personality were not included.

Conclusion

The high prevalence of depression among amputees in current study showed that the clinician should pay more attention to detect early symptoms of depression. The current findings suggest clinicians working with persons who have LLA should be mindful of the fact that many factors are associated with depression. The current study focuses more on the sociodemographic, clinical factors, quality of life and supports associated with depression among the amputees. Future studies could incorporate other causes found to be in relation to depression such as those related to individual (such as coping skills) and the level of pain.

References

1. Arifin N, Hasbollah HR, Hanafi MH, Ibrahim AH, Rahman WA, et al. (2017) Provision of prosthetic services following lower limb amputation in Malaysia. Malays J Med Sci 24: 106-111.

2. Yusof NM, Rahman JA, Zulkifly AH, Che-Ahmad A, Khalid KA, et al. (2015) Predictors of major lower limb amputation among type II diabetic patients admitted for diabetic foot problems. Singapore Med J 56: 626-631.

3. Hazmy W, Mahamud M, Ashikin N, Jamilah S, Yee LE, et al. (2001) Major limb amputations in Seremban Hospital: A review of 204 cases from 1997-1999. Malays J Med Sci 56 Suppl C, 3-7.

4. World Health Organisation, & International Society for Prosthetics and Orthotics (2005) Guidelines for training personnel in developing countries for prosthetics and orthotics services. WHO Library Cataloguing-in-Publication Data.

5. Horgan O, MacLachlan M (2004) Psychosocial adjustment to lower-limb amputation: A review. Disabil Rehabil 26: 837-850.

6. Ghous M, Gul S, Siddiqi FA, Pervaiz S, Bano S (2015) Depression, prevalence among depression. Professional Med J 22: 263-266.

7. Ephraim PL, Wegener ST, MacKenzie EJ, Dillingham TR, Pezzin LE (2005) Phantom pain, residual limb pain, and back pain in amputees: results of a national survey. Arch Phys Med Rehab 86: 1910-1919.

8. Darnall BD, Ephraim P, Wegener ST, Dillingham T, Pezzin L, et al. (2005) Depressive symptoms and mental health service utilization among persons with limb loss: Results of a National Survey. Arch Phys Med Rehab 86: 650-658.

9. Pedras S, Carvalho R, Pereira MG (2018) A predictive model of anxiety and depression symptoms after a lower limb amputation. Disabil Health J, 11: 79-85.

10. Reiber GE, McFarland LV, Hubbard S, Maynard C, Blough DK, et al. (2010) Service members and veterans with major traumatic limb loss from Vietnam war and OIF/OEF conflicts: Survey methods, participants, and summary findings. J Rehabil Res Dev 47: 275.

11. Üstün TB, Chatterji S, Bickenbach J, Kostanjsek N, Schneider M (2003) The International classification of functioning, disability and health: A new tool for understanding disability and health. Disabil Rehabil 25: 565-571.

12. Gunawardena NS, Seneviratne RA, Athauda T (2006) Functional outcomes of unilateral lower limb amputee soldiers in two districts of Sri Lanka. Mil Med 171: 283-287.

13. Pezzin LE, Dillingham TR, MacKenzie EJ (2000) Rehabilitation and the long-term outcomes of persons with trauma-related amputations. Arch Phy Med Rehab 81: 292-300.

14. Dozois DJA (2010) Beck depression inventory-II. In: The Corsini Encyclopedia of Psychology.

15. Mukhtar F, Abu Bakar AK, Mat Junus M, Awaludin A, Abdul Aziz S, et al. (2012) A preliminary study on the specificity and sensitivity values and

inter-rater reliability of Mini International Neuropsychiatric Interview (MINI) in Malaysia. ASEAN J Psychiatr 13: 157-164.

16. Zimet GD, Dahlem NW, Zimet SG, Farley GK (1988) Duplicate the multidimensional scale of perceived social support. J Pers Assess 52: 30-41.

17. Ng CG, Amer Siddiq AN, Aida SA, Zainal NZ, Koh OH (2010) Validation of the Malay version of the Multidimensional Scale of Perceived Social Support (MSPSS-M) among a group of medical students in Faculty of Medicine, University Malaya. Asian J Psychiatr 3: 3-6.

18. Whoqol group (1998) Development of the World Health Organization WHOQOL-BREF quality of life assessment. Med Psychol 28: 551-558.

19. Hasanah CI, Naing L, Rahman ARA (2003) World Health Organization Quality of Life Assessment: Brief Version in Bahasa Malaysia 58: 79-88.

20. Wellman G (2010) Depression after Amputation: Prevalence and risk factors A literature review.

21. Mozumdar A, Roy SK (2010) Depression in adult males with lower extremity amputation and its bio-social correlates. Health 2: 878-889.

22. Sahu A, Sagar R, Sarkar S, Sagar S (2016) Psychological effects of amputation: A review of studies from India. Ind Psychiatry J 25: 4.

23. Washington J (2013) The relations among psychological and demographic factors in individuals with lower limb amputation.

24. Wald J, Alvaro R (2004) Psychological factors in work-related amputation: Considerations for rehabilitation counselors.

25. Holzer LA, Sevelda F, Fraberger G, Bluder O, Kickinger W, et al. (2014) Body image and self-esteem in lower-limb amputees 9: 1-8.

26. Dunn DS (1996) Well-being following amputation: Salutary effects of positive meaning, optimism, and control p. 41.

27. Dadkhah B, Valizadeh S, Mohammadi E, Hassankhani H (2013) Psychosocial adjustment to lower-limb amputation: A review article 7.

28. Platisa N, Devecerski G (2006) Types of psychological reactions in patients with lower-extremity amputations. Medicinski Pregled 59: 149-154.

29. Hegeman AJM, Kok RM, Van Der Mast RC, Giltay EJ (2012) Phenomenology of depression in older compared with younger adults: A meta-analysis. Br J Psychiatry 200: 275-281.

30. Bulloch AGM, Williams JVA, Lavorato DH, Patten SB (2017) Journal of affective disorders the depression and marital status relationship is modified by both age and gender. J Affect Disord 223: 65-68.

31. Bhutani S, Bhutani J, Chhabra A, Uppal R (2016) Living with Amputation: Anxiety and Depression Correlates 10: 13.

32. Peyrot W, Lee S, Milaneschi Y (2016) The association between lower educational attainment and depression owing to shared genetic effects? Results in ~25,000 subjects 20: 735-743.

33. Bjelland I, Krokstad S, Mykletun A (2017) Does higher education protect against anxiety and depression? The HUNT Does a higher educational level protect against anxiety and depression? The HUNT study.

34. Yeoh SH, Tam CL, Wong CP, Bonn G (2017) Examining depressive symptoms and their predictors in Malaysia: Stress, locus of control, and occupation. Front Psychol 8: 1-10.

35. Pasquina PF, Miller M, Michael AJC, Vandersea J, Johnson E (2014) Special considerations for multiple limb amputation 273-289.

36. Yilmaz, M, Gulabi D, Kaya I, Bayram E (2015) The effect of amputation level and age on outcome: An analysis of 135 amputees. Eur J Orthop Surg Traumatol 26: 107-112.

37. Cansever CA (2018) Depression in men with trauma and lower part amputation: A comparison to men with surgical lower part amputation 168: 106-109.

38. Krans-Schreuder HK, Bodde MI, Schrier E, Dijkstra PU, Van den Dungen JA, et al. (2012) Amputation for long-standing, therapy-resistant type-I complex regional pain syndrome. J Bone Joint Surg Am 94: 2263-2268.

39. Ephraim P, Duncan L (2014) People With Amputation Speak Out. Amputee Coalition of America.

40. Riis U, Bååth C, Bøttcher C, Hommel A (2018) A prospective study of short-term functional outcome after dysvascular major lower limb amputation. Int J Orthop Trauma Nurs 28: 22-29.

41. Sugimoto T, Umeda M, Shinozaki T, Naruse T, Miyamoto Y (2015) Sources of perceived social support associated with reduced psychological distress at 1 year after the Great East Japan Earthquake: Nationwide cross-sectional survey in 2012. Psychiatry Clin Neurosci 69: 580-586.

42. Talwar P, Mohd Fadzil AR (2013) Perceived social support among university students in Malaysia: A reliability study. Malays J Psyc 22.

43. Olukolade O, Alao TI, Adebisi AA (2013) The role of social support and need for achievement on psychological well-being of below the knee amputees. 18: 23-27.

44. Unwin J (2009) A prospective study of positive adjustment to lower limb amputation 10: 1044-1050.

45. Mahdi M, Razak A, Tauhid MZ, Yasin NF, Hanapiah A (2016) Quality of life among lower limb amputees in Malaysia. Procedia Soc Behav Sci 222: 450-457.

46. Sinha R, Van Den Heuvel WJA (2011) A systematic literature review of quality of life in lower limb amputees. Disabil Rehabil 33: 883-899.

47. Akyol Y, Tander B, Goktepe AS, Safaz I, Kuru O (2013) Quality of life in patients with lower limb amputation: Does it affect post-amputation pain, functional status and perception of body image? J Musculoskelet Pain 21: 334-340.

48. Dajpratham P, Tantiniramai S, Lukkanapichonchut P (2011) Health related quality of life among the Thai people with unilateral lower limb amputation. J Med Assoc Thai 94: 250-255.

49. Cao W, Guo C, Ping W, Tan Z, Guo Y, et al. (2016) A community-based study of quality of life and depression among older adults. Int J Environ Res Public Health 13: 7.