Factors Associated with Vocational Reintegration Among the Thai Lower Limb Amputees

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Background: *Vocational reintegration is an important goal in the rehabilitation process. The amputees had to take time to adjust themselves to their new condition after lower limb amputation and that might have an impact on their vocation. As yet, there has been no information regarding vocational reintegration among the lower limb amputees in Thailand.*
Objectives: *To study the rate of vocational reintegration, factors associated with vocational reintegration among the lower limb amputees.*
Material and Method: *The postal survey with the questionnaires to 1,300 amputees who received the lower limb prostheses between 2001 and 2005 was conducted. The participants were divided into two groups namely the employed and unemployed groups. The Chi-Square and the Independent Sample T Test were used to compare the difference between the two groups. The multiple variables analysis by stepwise logistic regression was used to determine the associated factors.*
Results: *Three hundred and nine questionnaires were completed among 321 returned questionnaires (response rate 24.7%). Two hundred and forty seven males and 62 females with age ranging from 18-82 years old participated. The rate of vocational reintegration was 66.7%. Demographically, the employed group had less diabetes mellitus ($p = 0.001$), higher educational level ($p = 0.004$), were younger at the time of amputation ($p < 0.001$) and etiologies of amputation were blast injury from mines and congenital problems ($p = 0.005$). Prosthetic use and problems: the employed group used no gait aids ($p < 0.001$), had satisfactory to good wearing comfort ($p = 0.005$), wore prostheses longer hours per day ($p < 0.001$). The factors associated with vocational reintegration were etiologies of amputation from the blast injury from mines and congenital problems (OR 3.3), educational level from secondary school (OR 2.3), at least satisfactory to good wearing comfort (OR 1.16), and younger at the time of amputation (OR 0.97) respectively.*
Conclusion: *This information can assist the rehabilitation personnel to encourage the vocational reintegration among the Thai lower limb amputees.*

Keywords: *Amputation, Factors, Lower limb amputees, Thai, Vocation*

J Med Assoc Thai 2008; 91 (2): 234-9
Full text. e-Journal: *http://www.medassocthai.org/journal*

Lower limb amputation is a major life event. It can cause functional disability in both mobility and activities of daily living. Moreover, social handicap would result from the surrounding physical environment. For returning to work, any vocation requiring prolonged standing or walking, carrying of heavy loads, and running will present difficulty. The rate of vocational reintegration among the lower limb amputees was variously reported from 50-89%[1,2].

As yet, there has been no information regarding the vocational reintegration after amputation among the Thai lower limb amputees. Therefore, the

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objectives of the present study were to explore the numbers of lower limb amputees who have worked after the amputation, and to determine the factors associated with the vocational reintegration.

Material and Method

The participants were selected from the lists of lower limb amputees who received the lower limb prostheses from three centers, which included one medical school in Bangkok and two big general hospitals situated in Ratchaburi and Chanthaburi provinces from 2001-2005. The inclusion criteria were being over 17 years old, having had lower limb amputation for at least 6 months and having received the lower limb prostheses from these hospitals. The total number of patients eligible to participate was 1,300 amputees.

The postal survey with a questionnaire was conducted in January 2006. The questionnaire consisted of two parts. In the first part, the questions concerned patient characteristics, comorbidities, occupation after the amputation, and aspects related to amputation (e.g. side, level, etiologies and age at the time of amputation). In the second part, the questions concerned aspects related to the prosthetic use such as amount of use, pain and wearing comfort of prostheses including mobility level.

Statistical analysis

The calculation of sample size was performed before conducting the study. The minimal number was 257 amputees from each hospital. In order to prevent the loss and incompleteness of the data, an additional 30% more amputees were also recruited by being sent the questionnaire. The total number was 450 amputees from each of the three hospitals.

The rate of vocational reintegration was reported as the percentage of amputees who had working experience after their amputation. The amputees who had working experience were classified as the employed group and those who had not were classified as the unemployed group. The comparison of the employed and unemployed groups was performed by the Chi-square test for the qualitative data, the Chi-square for Trend for the ordered outcomes and the Independent Sample T-test for the quantitative data. The multiple variables analysis by stepwise logistic regression was used to explore the associated factors of the vocational reintegration among the amputees.

Results

The questionnaires were sent to 1,300 amputees. A hundred and fifty questionnaires were sent back because of no receivers. Three hundred and nine questionnaires were completed among 321 returned questionnaires (response rate 24.7%). There were 247 males and 62 females with age ranging from 18-82 years old. Two hundred and six amputees (66.7%) were employed after amputation, whereas 103 amputees have been unemployed. The percentage of the employed and unemployed amputees from Bangkok and Chanthaburi was reported and were quite close in value (Table 1). The rate of employed amputees from Ratchaburi was less than the amputees from the other two hospitals.

Of the demographic-related factors (see Table 2), higher educational level, non-diabetic amputees, younger age at the time of amputation and etiologies of amputation showed a statistically significant as well as a clinically relevant difference between the two groups. The amputees whose etiologies of amputation were from traffic accidents, blast injury from mines, and congenital problems were more likely to return to work than the amputees whose etiologies were from the medical problems such as diabetes mellitus, cancer or vascular problems. Age at the time of study showed significant difference but no clinical relevance.

Prosthetic-related factors that showed a statistically significant as well as clinically relevant difference between the two groups were satisfactory to good wearing comfort and good mobility. The wearing comfort was rated on the VAS and classified as good when the score was more than seven. However,

Table 1. The numbers of employed and unemployed amputees among three sites

Working status	Sites			Total (%)
	Bangkok (%)	Chanthaburi (%)	Ratchaburi (%)	
Employed	86 (74.8)	60 (75.9)	60 (52.2)	206 (66.7)
Unemployed	29 (25.2)	19 (24.1)	55 (47.8)	103 (33.3)

Table 2. The comparison of employed and unemployed amputees

Variables	Employed (n = 206)	Unemployed (n = 103)	p-value
Demographic-related			
Age (yrs)**	45.6 ± 12.8	50.1 ± 15.6	0.007*
Gender			
Male	166 (80.6)	81 (78.6)	0.802
Female	40 (19.4)	22 (21.4)	
Marital status			
Single	88 (42.7)	52 (53.4)	0.116
Married	118 (57.3)	48 (46.6)	
Education			
Primary school	123 (59.7)	81 (78.6)	0.004*[a]
Secondary school	56 (27.2)	16 (15.5)	
Bachelor degree and higher	27 (13.1)	6 (5.8)	
Comorbidities			
Hypertension	42(20.4)	24 (23.3)	0.659
Diabetes mellitus	22 (10.7)	27 (26.2)	0.001*
Cardiopulmonary	7 (3.4)	9 (8.7)	0.085
Dyslipidemia	21 (10.2)	9 (8.7)	0.839
Musculoskeletal	35 (17.0)	17 (16.5)	1.000
Cancer	1 (0.5)	2 (1.9)	0.259
Vascular	7 (3.4)	9 (8.7)	0.085
Amputation-related			
Side of amputation			
Unilateral	202 (98.1)	100 (97.1)	0.690
Bilateral	4 (1.9)	3 (2.9)	
Amputation level			
Transfemoral & bilateral	60 (29.3)	28 (29.2)	0.800
Knee & transtibial 146 (70.7)	75 (70.8)		
Age at the time of amputation (yrs)**	30.6 ± 13.7	39.1 ± 17.6	<0.001*
Etiologies			
Traffic accident	113 (55.1)	62 (60.2)	0.005*[a]
Medical problems	35 (17.1)	28 (27.2)	
Blast & congenital	57 (27.8)	13 (12.6)	
Prosthetic use & problems			
Mobility level			
Not mobile	2 (1)	13 (12.7)	<0.001*[a]
Use gaitaid	28 (13.5)	35 (33.9)	
No gaitaid	176 (85.5)	55 (53.4)	
Wearing comfort**	7.3 ± 2.6	6.3 ± 2.9	0.005*
Stump pain	62 (30.2)	29 (28.2)	0.805
Stump ulcer	72 (35.1)	26 (25.2)	0.104
Phantom pain	41 (20.0)	29 (28.2)	0.142
Daily use			
≤ 8 hours	48 (21.1)	57 (58.3)	<0.001*
> 8 hours	162 (78.9)	46 (41.7)	

Note: * Significant at p-value < 0.05, ** Mean ± SD, *** Multiple responses, [a] Chi-square for trend

these two factors may influence the wearing time per day resulting in statistical significance but no clinical relevance.

There were no significant differences between the two groups regarding gender, marital status, other comorbidities, side and level of amputation, the problems of stump pain, ulcer and phantom pain (Table 2).

The stepwise logistic regression analysis found that the educational level, etiologies of amputation, age at the time of amputation and wearing comfort

Table 3. The associated factors of vocational reintegration

Variables	Odds ratio	95%CI odds ratio	p-value
Educational level			0.04*
Primary	1.00		
Secondary	2.30	1.12-4.73	0.02*
Bachelor degree and higher	2.21	0.81-6.02	0.12
Etiologies			0.01*
Traffic accident	1.00		
Medical problems	1.36	0.64-2.88	0.42
Blast & congenital	3.30	1.50-7.24	0.003*
Wearing comfort	1.16	1.05-1.29	0.004*
Age at the time of amputation	0.97	0.95-0.99	0.003*

* Significant at p-value < 0.05

were associated with the vocational reintegration (Table 3). Regarding the educational level, the amputees who have graduated from secondary schools and higher returned to work significantly more often than those who have graduated from primary schools with the odds ratio being 2.3. The amputees whose etiologies were the congenital problems and blast injury returned to work significantly more often than those injured from traffic accidents with the odds ratio being 3.3. The better wearing comfort, the more chance of returning to work with the odds ratio being 1.16. Additionally, age at the time of amputation also had an influence. The older the amputee was at the time of amputation, there was less likelihood of returning to work with the odds ratio being 0.97.

Discussion

In the present study, the authors recruited the amputees aged over 17 years old since they would have graduated from secondary schools and some of them might have started working. Most Thai people do agricultural work and continue working lifelong so the authors did not limit the age groups of the presented participants. In addition, the authors recruited the amputees with various etiologies of amputation to explore the associated factors of vocational reintegration. The results would enable rehabilitation personnel to try to enhance the rate of return to work in the real situation.

The authors found that the rate of vocational reintegration among the participants in the present study was 66.7%, which was comparable to the study of Fisher[3]. Millstein[2] was able to show a higher return to work rate but participants of that study were all injured at work and were offered re-employment by their employers. In comparing the differences between the employed and unemployed groups, the authors did not use only statistical significance. In addition, the authors defined what was thought to be clinically relevant differences among those several indicators.

Among our employed group, most of them had graduated from secondary schools and higher level at a significantly higher rate than the unemployed group. This is a very similar result to the studies of others[1,4,5]. Amputees with a higher educational level had more chances to find job and were better able to control the scheduling of their work. Regarding the comorbidities, amputees who were diabetic had significantly fewer chances to return to work. Since they were usually older, they had complications related to diabetes mellitus in several systems that markedly decreased physical strength and fitness. Thus, most of them had to voluntarily retire from their work. Pohjolainen[6] also found that many elderly diabetic patients undergoing amputation had a reduced physiological reserve and high mortality. Diabetes is common in Thailand. The estimated national prevalence in Thai adults was 9.6%, which one-half of all cases were undiagnosed[7]. Therefore, these people were not aware of diabetic related complications.

The employed amputees were younger at the time of amputation. The influence of age on the return to work was also found by Millstein[2] and Schoppen[5]. After recovery from amputation, the amputees needed some time to fit a prosthesis. Moreover, they also had to take more time to adjust themselves to their new physical conditions and handle the psychosocial reactions. Schoppen found that the mean delay between the amputation and the return to work was 2.3 years[8]. If they were older, these processes would take longer

and that would lessen the chances of vocational reintegration.

The etiologies of amputation in Thailand were rather different from the studies of others. Besides the common etiologies such as traffic accident, vascular problems, diabetes mellitus, and cancer, blast injury from mines was very common in Thailand especially among those who resided near the borders. These amputees and amputees because of congenital problems had higher chances to return to work than the victims from traffic accidents and other common etiologies. Traffic accidents might injure several systems. The other common etiologies were systemic diseases that had an impact on many systems as well. Thus, they would be too sick to return to work.

Wearing comfort was significantly different between the two groups. This finding was similar to the study of Schoppen[5]. The better wearing comfort, the more usage of prostheses. In contrary, there were no significant differences of phantom pain, stump pain, and stump ulcer between the two groups. This finding is still controversial since Millstein[2] concluded pain was negatively related to successful employment whereas Ide[9] did not find such a relation.

Mobility level was also influenced upon vocational reintegration. The present finding showed that the employed amputees did not use gait aids significantly more than the unemployed ones.

After the stepwise logistic regression analysis, the only factors associated with the vocational reintegration were educational level, etiologies of amputation, wearing comfort, and age at the time of amputation. If the authors would like to increase the rate of vocational reintegration, the authors need to target the amputees who have graduated from secondary schools or a higher level, had amputation from blast injury or congenital problems, had satisfactory to good wearing comfort with the prosthetic socket, and were young at the time of amputation.

The present study may not well represent all amputees in Thailand due to the low response rate. Moreover, the authors were unable to do further analysis of the non-respondents since the database are not well established. However, the presented result would be able to apply to the population with the similar demographic characteristics to ours. The amputees who had either the unilateral transtibial amputation or knee disarticulation and rather young at the time of amputation were the main population. Thus, considering these characteristics, the comparison could be made relevantly.

Conclusion

The rate of vocational reintegration among the Thai lower limb amputees was 66.7%. The factors associated with the vocational reintegration were educational level, etiologies of amputation, wearing comfort, and age at the time of amputation. This information will assist the rehabilitation personnel in designing the strategies needed to increase the rate of vocational reintegration among these people in order to make them productive members and have a better quality of life.

Acknowledgements

The present study was supported by the Research Development Fund, Faculty of Medicine Siriraj Hospital, Mahidol University. The authors wish to thank Mr. Sutthipol Udompanturak for his assistance in the statistical analysis.

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ปัจจัยที่สัมพันธ์กับการกลับไปประกอบอาชีพในผู้พิการขาขาดชาวไทย

ปิยะภัทร เดชพระธรรม, สุชาติ ตันตินิรามัย, ปราณี ลักขณาภิชนชัช, ศิริลักษณ์ แก้วนารี

วัตถุประสงค์*: เพื่อศึกษาอัตราการกลับไปประกอบอาชีพ ปัจจัยที่สัมพันธ์กับการกลับไปประกอบอาชีพ*
วัสดุและวิธีการ*: ทำการสำรวจผู้พิการขาขาดและได้รับขาเทียมจำนวน 1,300 คนตั้งแต่ปี พ.ศ. 2544-2548 โดยวิธีการส่งแบบสอบถาม แล้วแบ่งผู้เข้าร่วมวิจัยเป็น 2 กลุ่ม คือ ผู้ที่กลับไปประกอบอาชีพและผู้ที่ไม่ได้ประกอบอาชีพ วิเคราะห์ความแตกต่างระหว่าง 2 กลุ่มโดยใช้ Chi-square, Chi-square for trend และ independent sample T-test ส่วนปัจจัยที่สัมพันธ์กับการกลับไปประกอบอาชีพวิเคราะห์โดยใช้ stepwise logistic regression*
ผลการศึกษา*: มีแบบสอบถามตอบกลับอย่างสมบูรณ์จำนวน 309 ฉบับจากแบบสอบถามที่ส่งกลับมา 321 ฉบับ (อัตราการตอบกลับร้อยละ 24.7) ผู้เข้าร่วมวิจัยเป็นชาย 247 คนและหญิง 62 คน อายุ 18-82 ปี อัตราการกลับไปประกอบอาชีพเท่ากับร้อยละ 66.7 ด้านลักษณะประชากรผู้ที่กลับไปประกอบอาชีพมีโรคประจำตัว เป็นเบาหวานน้อยกว่า ($p = 0.001$) ระดับการศึกษาสูงกว่า ($p = 0.004$) ขาขาดเมื่ออายุน้อยกว่า ($p < 0.001$) สาเหตุของอาการขาขาดส่วนใหญ่เกิดจากการโดนกับระเบิดและความพิการแต่กำเนิด ($p = 0.005$) ด้านการใช้และปัญหาที่เกิดจากการใช้ขาเทียม ผู้ที่กลับไปประกอบอาชีพส่วนใหญ่ไม่ต้องใช้เครื่องช่วยเดิน ($p < 0.001$) มีความสบายจากการสวมใส่ขาเทียมอยู่ในระดับน่าพอใจจนถึงระดับดี ($p = 0.005$) และใส่ขาเทียมต่อวันนานกว่า ($p < 0.001$) ปัจจัยที่สัมพันธ์กับการกลับไปประกอบอาชีพ ได้แก่ สาเหตุของอาการขาขาดเนื่องจากการโดนกับระเบิด และความพิการแต่กำเนิด (OR 3.3) การศึกษาตั้งแต่ระดับมัธยมขึ้นไป (OR 2.3) ความสบายจากการสวมใส่ขาเทียมอยู่ในระดับน่าพอใจจนถึงระดับดี (OR 1.16) และอายุน้อยเมื่อขาขาด (OR 0.97) ตามลำดับ*
สรุป*: บุคลากรทางการฟื้นฟูสมรรถภาพสามารถใช้ข้อมูลจากการศึกษานี้เพื่อส่งเสริมการกลับไปประกอบอาชีพในผู้พิการขาขาดชาวไทย*